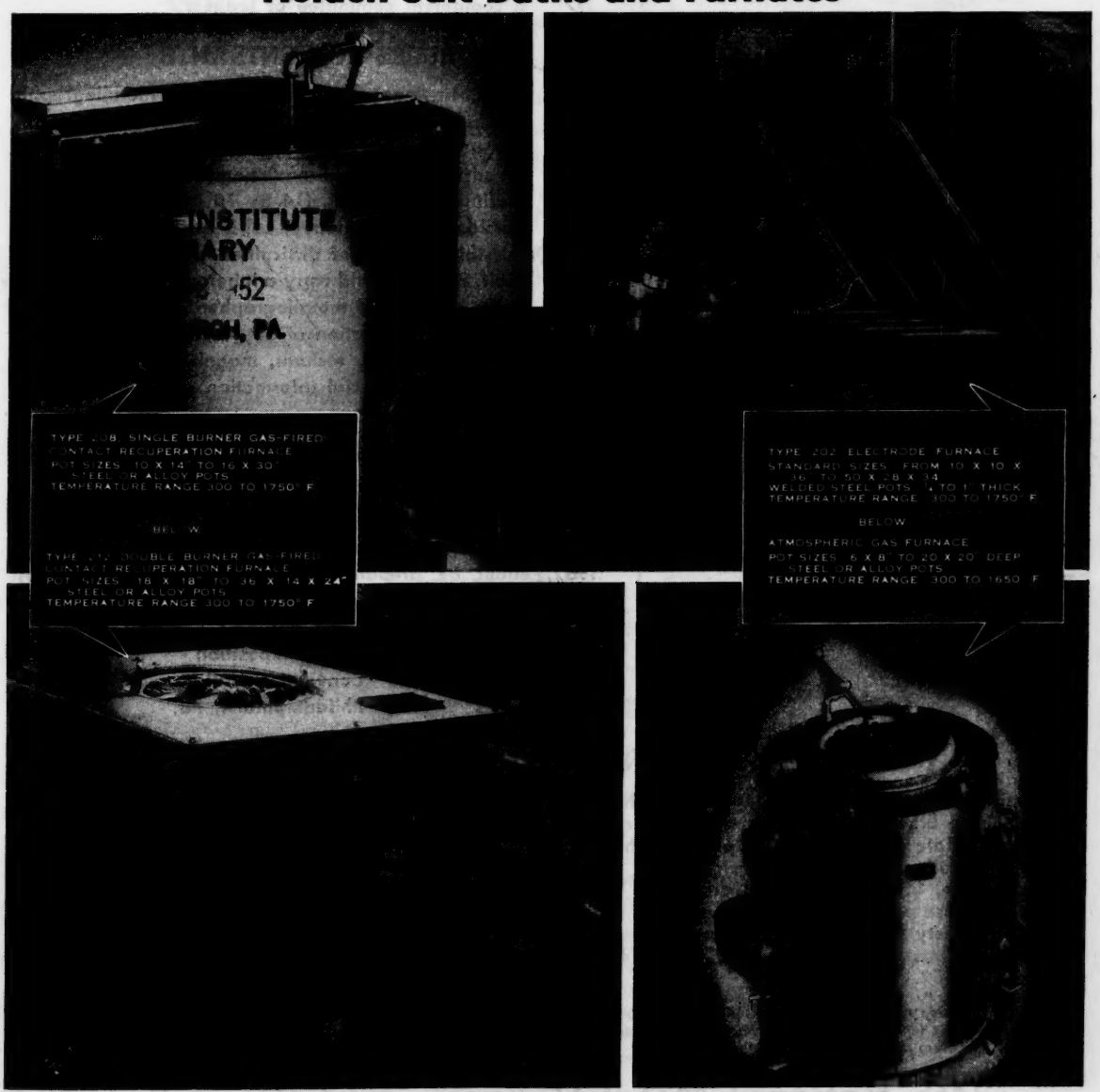
Metals Review

THE NEWS DIGEST MAGAZINE

Volume XXV - No. 8 August, 1952

There is NO divided responsibility when you purchase Holden Salt Baths and Furnaces


TYPE 208 SINGLE BURNER GAS-FIRED CONTACT RECUPERATION FURNACE
POT SIZES 10 X 14" TO 16 X 30"
STEEL OR ALLOY POTS
TEMPERATURE RANGE 300 TO 1750° F
BELOW
TYPE 212 DOUBLE BURNER GAS-FIRED CONTACT RECUPERATION FURNACE
POT SIZES 18 X 18" TO 36 X 14 X 24"
STEEL OR ALLOY POTS
TEMPERATURE RANGE 300 TO 1750° F
TYPE 202 ELECTRODE FURNACE
STANDARD SIZES FROM 10 X 10 X 16 TO 50 X 28 X 34
WELDED STEEL POTS ¼ TO 1" THICK
TEMPERATURE RANGE 300 TO 1750° F
BELOW
ATMOSPHERIC GAS FURNACE
POT SIZES 6 X 8" TO 20 X 20" DEEP
STEEL OR ALLOY POTS
TEMPERATURE RANGE 300 TO 1650° F

Write for Free Literature

THE A. F. HOLDEN COMPANY

P.O. Box 1898 New Haven 8, Conn. 11300 Schaefer Highway, Detroit 27, Michigan

ASM 7th metallographic exhibit

Entries are invited in the 7th Metallographic Exhibit, to be held during the National Metal Exposition in Philadelphia the week of Oct. 20 through 24, 1952. Entries will be displayed to good advantage and awards will be given for the best micrographs as decided by a competent committee of judges.

CLASSIFICATION OF MICROS

1. Toolsteels and tool alloys
2. Stainless and heat resisting steels
3. Other steels and irons
4. Aluminum, magnesium, beryllium, titanium and their alloys
5. Copper, zinc, lead, nickel and their alloys
6. Metals and alloys not otherwise classified
7. Series showing transitions or changes during processing
8. Surface phenomena
9. Results by unconventional techniques (other than electron micrographs)
10. Slags, oxides and inclusions

RULES FOR ENTRANTS

Work which has appeared in previous metallographic exhibits held by the American Society for Metals is unacceptable. Photographic prints shall be mounted on stiff cardboard of maximum dimensions approximating 15 by 22 in. (14 by 18 in. for entries from outside U. S. A.). Heavy, solid frames are not permissible because of difficulties in mounting the exhibit. Entries should carry a label giving:

Name of metallographer
Classification of entry
Material, etchant, magnification
Any special information as desired

Transparencies or other items to be viewed by transmitted light must be mounted on light-tight boxes wired for plugging into lighting circuit, and built so they can be fixed to the wall.

Exhibits must be delivered between Sept. 25 and Oct. 15, 1952, either by prepaid express, registered parcel post or first class letter mail.

Address: Metallographic Exhibit
Metal Exposition
Convention Halls
Philadelphia 4, Pa.

AWARDS AND OTHER INFORMATION

A committee of judges will be appointed by the Metal Congress management which will award a First Prize (a medal and blue ribbon) to the best in each classification. Honorable Mentions will also be awarded (with appropriate medals) to other photographs which, in the opinion of the judges, closely approach the winner in excellence.

A Grand Prize, in the form of an engrossed certificate, and a money award of $100 will be awarded the exhibitor whose work is adjudged best in the show, and his exhibit shall become the property of the American Society for Metals for preservation and display in the Society's headquarters.

All other exhibits will be returned to owners by prepaid express or registered parcel post during the week of Oct. 27, 1952.

Entrants living outside the U. S. A. will do well to send their micrographs by first-class letter mail endorsed "May be opened for customs inspection before delivery to addressee".

A "Student Competition" will also be made part of the exhibit, as in the past few years. Rules for entries in the Student Division were published in the February and March issues of Metals Review.

34th National Metal Congress and Exposition

Philadelphia, Pa. **October 20 to 24, 1952**

MELLON INSTITUTE
LIBRARY
AUG 22 1952
PITTSBURGH, PA.

Metals Review

THE NEWS DIGEST MAGAZINE

VOLUME XXV, No. 8 AUGUST, 1952

MARJORIE R. HYSLOP, Editor
BETTY A. BRYAN, Associate Editor
RAY T. BAYLESS, Publishing Director
GEORGE H. LOUGHNER, Production Manager
A. P. FORD, Advertising Manager

• • •

DISTRICT MANAGERS

Donald J. Billings
7301 Euclid Ave., Cleveland 3, Ohio
UTah 1-0200

John F. Tyrrell
John B. Verrier, Jr.
55 West 42nd St., New York 18
CHickering 4-2718

Ralph H. Cronwell,
482 Burton Ave., Highland Park, Ill.
HIghland Park 2-4263

• • •

Published monthly by the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio; John Chipman, President; Ralph L. Wilson, Vice-President; William H. Eisenman, Secretary; R. L. Dowdell, Treasurer; J. B. Johnson, George A. Roberts, James B. Austin, James T. MacKenzie, Trustees; Walter E. Jominy, Past President. Subscriptions $5.00 per year ($6.00 foreign). Single copies $1.00. Entered as Second Class Matter, July 26, 1930 at the Post Office at Cleveland, Ohio, under the Act of March 3, 1879.

Claims for missing numbers will not be allowed if received more than 60 days from date of issue. No claims allowed from subscribers in Central Europe, Asia or the Pacific islands other than Hawaii, or because of failure to notify the circulation department of a change of address or because copy is "missing from files".

CONTENTS

NATIONAL METAL CONGRESS PREVIEW

Tentative Schedules of Technical Programs
- American Society for Metals 9
- American Welding Society 10
- Special Libraries Association 10
- Institute of Metals Division A.I.M.E. 11
- Society for Non-Destructive Testing 12

Philadelphia Story 5
Metal Show News 7
Conference on Refractory Materials for High-Temperature Applications 14
Roster of Chapter Officers, 1952-53 16

IMPORTANT LECTURES

Automotive Laboratory Tests 6
M. F. Garwood

Metal Spring Performance 8
Otto R. Hills

DEPARTMENTS

Thirty Years Ago 14
Compliments 14
Important Meetings 20
Employment Service Bureau 60

ASM REVIEW OF METAL LITERATURE

A — GENERAL METALLURGICAL 21
B — RAW MATERIALS AND ORE PREPARATION 22
C — NONFERROUS EXTRACTION AND REFINING 23
D — FERROUS REDUCTION AND REFINING 24
E — FOUNDRY 25
F — PRIMARY MECHANICAL WORKING 28
G — SECONDARY MECHANICAL WORKING 29
H — POWDER METALLURGY 31
J — HEAT TREATMENT 31
K — JOINING 32
L — CLEANING, COATING AND FINISHING 35
M — METALLOGRAPHY, CONSTITUTION AND PRIMARY STRUCTURES 39
N — TRANSFORMATIONS AND RESULTING STRUCTURES 40
P — PHYSICAL PROPERTIES AND TEST METHODS 42
Q — MECHANICAL PROPERTIES AND TEST METHODS; DEFORMATION 44
R — CORROSION 52
S — INSPECTION AND CONTROL 54
T — APPLICATION OF METALS IN EQUIPMENT AND INDUSTRY 57
V — MATERIALS 58

America's largest

and most important annual

Industrial event

NATIONAL METAL EXPOSITION

Co-sponsors of the National Metal Congress and Exposition American Society for Metals . . . American Welding Society . . . American Institute of Mining & Metallurgical Engineers (Institute of Metals Division) . . . Society for Non-Destructive Testing, Inc.

PHILADELPHIA OCT. 20-24

welcome adelphia

October 1952 – National Metal Congress and Exposition

Philadelphia, host to the National Metal Congress and Exposition from Oct. 20 through 24, 1952, is a city well able to occupy the Metal Show visitors' spare moments. In Philadelphia it is easier to capture the spirit of America's beginnings than in any other of our great cities. So many of the beginnings are still there, all available for inspection, all within a stone's throw of intown Philadelphia. History is a living thing there, not monumental or forbidding, but rather a casual part of the everyday landscape. The visitor can see it in a modest red-brick building, a street lamp, an ancient grave a few feet off the sidewalk, in a Revolutionary-style house still being occupied.

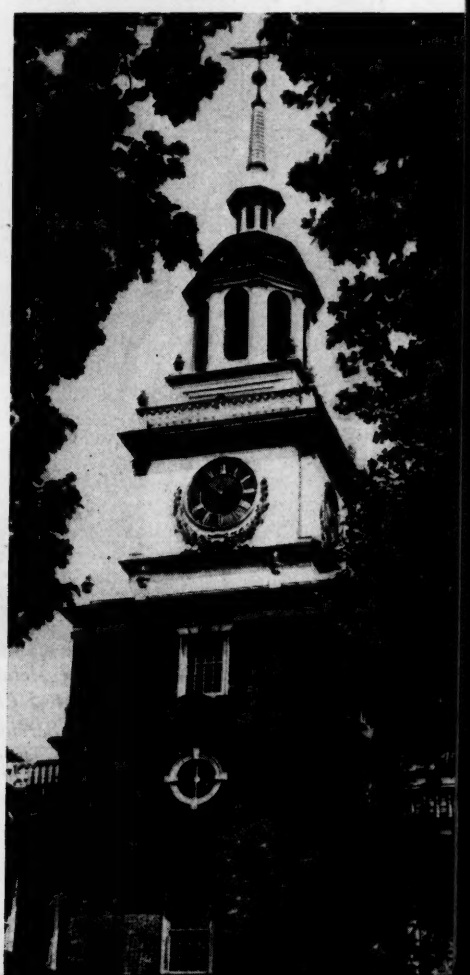
At Independence Hall, which Philadelphians call the State House, on Chestnut St. between 5th and 6th, anyone can push open a door and walk into the room where the Declaration of Independence was adopted and signed, and where the Constitution was written, or visit the shrine of the Liberty Bell.

The tides of political power which made Philadelphia the first capitol of the United States have long since shifted to Washington, and the leadership in business and finance which it once enjoyed was taken over by New York more than 100 years ago. But, in the art of living with history, the sprawling middle city of the Delaware River (the third largest city in the United States), remains pre-eminent. Freedom seems to be more at ease there, more disposed to receive callers.

After spending your business day at Convention Hall on the banks of the Schuylkill River in the industrial district, at the National Metal Exposition, take a leisurely walk along any street that leads away from Independence Hall and you will find some fragment of American history attached to each block and corner. Carpenter's Hall, the first capitol of the unbuilt Nation, is just a few doors east of the Hall. The first U. S. Mint is in the same vicinity, as are the home of Betsy Ross, the old City Hall where the first Supreme Court sat from 1791 to 1800, the Philadelphia Art Museum, Memorial Hall, and the Rodin Museum.

Franklin Institute, on the Parkway at 20th St. is the ideal place for the visitor who likes gadgets and mechanics, printing presses or stars. Here you can push buttons, pull levers, perform experiments and test to your own satisfaction some of the great scientific theories. You can see a miniature cracking plant convert crude oil into gasoline, pilot a plane, operate the controls of a locomotive, or see paper made from wood pulp and type being set.

Philadelphia, the National Metal Congress and Exposition home this year, has something in store for every visitor who cares to review a part of America's past, in order to see more clearly into its future.



Every Visitor to Philadelphia Can Find Something of Interest to See in Franklin Institute (Above), Convention Hall (Below), or Independence Hall (Right). (Courtesy Philadelphia Convention and Visitors Bureau)

Columbus Hears Talk On Toolsteel Uses

Reported by Paul S. Maynard

Engineering Laboratory
North American Aviation, Inc.

A discussion on the "Characteristics and Applications of Toolsteels", was presented by C. P. McShane, metallurgist, Sanderson Holcum Works, Crucible Steel Co., at the June meeting of the Columbus Chapter. He cited information pertinent to the selection of toolsteels, design recommendations, heat treatment difficulties, and made general comments on the machining and grinding of these tools.

Mr. McShane also explained the effect of expansion and contraction during heat treatment as related to internal stresses and microstructure.

Honorary certificates commemorating 25 years of consecutive membership in the Society were awarded to the following: Clyde E. Williams, Battelle Memorial Institute; Lewis S. Colby, E. F. Houghton & Co.; P. R. Letz, Cooper Bessemer Corp.; and George M. Moffat, Ohio State University. The Bonney-Floyd Co., Buckeye Steel Casting Co., Jeffrey Manufacturing Co., and Columbus Bolt & Forging Co., sustaining members, also received 25-year certificates.

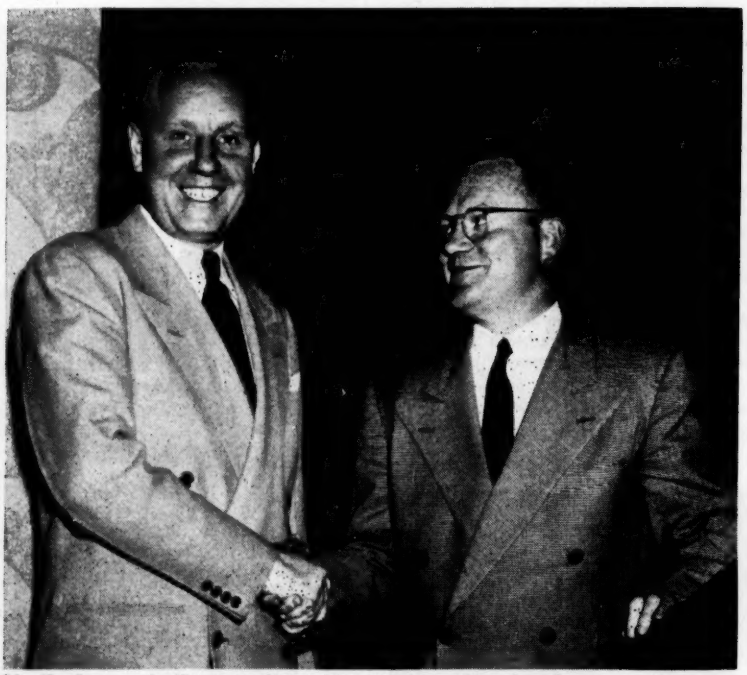
Fulbright Awards Announced

The Conference Board of Associated Research Councils, Committee on International Exchange of Persons, has announced the 1953-54 competition for Fulbright awards for university lecturing and post-doctoral level research in Europe and the Near East. Included in this competition are awards for Austria, Belgium and Luxembourg, Denmark, Egypt, France, Greece, Iraq, Italy, Netherlands, Norway, Turkey, the United Kingdom and its colonial dependencies, as well as Japan, Pakistan, and the Union of South Africa.

The Committee is preparing a detailed program booklet concerning the awards. These booklets may be obtained by writing to the Conference Board of Associated Research Councils, Committee on International Exchange of Persons, 2101 Constitution Ave., Washington 25, D. C.

Applications must be postmarked no later than Oct. 15, 1952.

Discusses Automotive Laboratory Tests



M. F. Garwood (Right), Chief Metallurgist, Chrysler Corp., Is Congratulated by M. M. Jenkins, Technical Chairman, After His Talk on "Correlation of Laboratory Tests With Service Performance" in Pittsburgh in May

Reported by R. D. Manning

Research Laboratory
U. S. Steel Co.

Members of the Pittsburgh Chapter heard M. F. Garwood, chief metallurgist of Chrysler Corp., discuss "Correlation of Laboratory Tests and Service Performance" at the May meeting.

Mr. Garwood pointed out that the results of laboratory fatigue tests, properly selected, performed and interpreted, show a definite correlation with the service performance of automotive parts. That perfect agreement is not always observed is not sufficient reason for disregarding the importance of laboratory tests.

Inasmuch as the majority of failures in automotive parts occur by fatigue, an investigation was begun at Chrysler on the fundamental properties of automotive materials in order to increase the fatigue limits of these parts. The investigation included a laboratory study, on standard reverse-bend fatigue specimens, of the effect of surface finish, hardness, stress concentration, shot peening, and decarburization on the fatigue limits of a number of steels. Results were applied to specific automotive components and supplemented by road tests. Four specific parts were included in this study: steering knuckles, front-suspension coiled springs, rear flat springs, and rear axle shafts.

Laboratory results indicated that fatigue limits of a number of alloy steels increase similarly with increasing hardness up to a limiting hardness, which is higher the higher the carbon content, and then decrease with considerable scatter. Notch sensitivity in fatigue does not increase with increasing hardness, surface decarburization markedly decreases fatigue strength, and shot peening does not appear to increase the fatigue strength of highly polished (superfinished) specimens.

In correlating laboratory work with service performance of critical parts such as steering knuckles, an analysis of road-test data led to the development of an applied stress index, which is the working stress on the knuckle divided by the product of the surface hardness and a factor for the surface finish. On the basis of the failure pattern observed in road-test failures, a fatigue machine was designed to test full-size steering knuckles in reverse bending. Cold rolling the fillet radius, where most failures occur, increased the fatigue strength of alloy-steel knuckles by 50%, and raising the Brinell hardness from 255-285 to 285-321 increased fatigue strength by another 19%. A special fixture was used to induction-harden fillets of steering knuckles made of AISI 1033 steel, and the knuckles were tempered at 800° F. to Rockwell C-45, which raised fatigue strength about 69%.

Another critical part is the front suspension coil spring. There are no normal surface-fatigue failures of coil springs, but rather mechanical failures from unintentional faults such as weld deposits and corrosion pits. Special tests on coil springs showed that shot peening the springs and increasing the hardnesses of the springs resulted in significant in-

(*Continued on page 7*)

METAL SHOW NEWS
Dateline: Philadelphia, Oct. 20-24

A month-by-month preview of the National Metal Congress and Exposition

AUGUST—Habit is a powerful thing. Most men are creatures of habit. They do, think, buy and behave in definite habit patterns.

Not many of us realize how much habit controls our lives—that is, until one of our bad habits gets us into a spot, and we find ourselves wondering how we got there.

A case in point is what goes on every year when folks have to get new auto license plates or else get tagged off the streets by resigned policemen. Folks know they have to have licenses —and by a specific date. They think about it, but habit says there's plenty of time. Do it tomorrow. It mostly just doesn't get done or we wouldn't see thousands sweating it out in long lines in a last-minute rush to get license plates.

Habit is likely to get a lot of folks into a similar spot come opening day of the Big Metal Show this October in Philadelphia.

Every man invited to the Show—and close to 50,000 will be invited— will hate to lose time standing in line to be registered in. But we'll bet you a '52 dollar to a week-old doughnut that thousands—yes, thousands—will put off registration until they are forced to queue up and let their arches go flat and their tempers boil over while a big registration staff works at top speed to get them into the Show.

Fortunately, most members of A.S.M. and the cosponsoring societies get their registrations in early. However, enough do not—and enough prospective customers of Show exhibitors do not—to make on-the-grounds registration a major headache to everybody involved.

So forget your bad habits and use the advance registration coupon on page 63 of this issue. If someone has beat you to it and already snipped it out, there are probably exhibiting companies in your town who are sending out Show invitations and will be glad to get the registrations in.

It won't take much time. A phone call will do the trick.

~~ ~~ ~~

Let's take a look at what we'll find at the Big Metal Show

Not in terms of exhibits and displays, but in physical comforts, appearance and quality of the exposition halls themselves.

First, the new decorative theme pays due homage to metals and it'll stop you in your tracks—and incidentally, those tracks will be made on foam-rubber-backed carpeting in a brilliant, gala red that'll stretch for more than two actual miles through the aisles!

The management of the Convention Hall (a city-owned and operated unit) some time ago decided it was lax in keeping its biggest attraction in tip-top shape. Result? Well, brand-new, ultra-modern restrooms have been installed. They'll be gleaming, spotless, sanitary to the highest degree. They'll have adjoining lounge rooms for comfort and relaxation.

The city fathers have done some other things around the premises to make your visit more pleasant. The place is newly painted in part and when all the exhibitors get their displays up and running you'll see a colorful dramatic expanse of interest-sharpening atmosphere—the spirit-lifting pull of the Big Metal Show that makes it someing extra-ordinary, something different and more impelling than any other industrial show under the sun.

Planning your Show time is the smart way to get first-hand information about the things you're really interested in. You can do that by prechecking the official Show Program that'll get to all registered invitees sometime before the Show opens, and will be previewed in the September issue of *Metals Review*. The official program is a complete, factual, informative book that tells you where to find specific exhibits, whom you'll meet at an exhibitor's booth, where and when technical sessions are being held.

It's a big convenience—and an important factor in letting a big majority of Show visitors schedule their time effectively.

A.S.M. has for some time now been asking exhibitors for lists of customers and prospective customers to whom Metal Show promotional literature may be mailed. The response is heartening, but we wonder if among our own Society membership there isn't a pretty big field of important metal industries people who ought to be on those lists. Certainly you must know some of them in your town. If you can find the time, jot down their names, their firm names and their positions, and send them along to A.S.M. headquarters in Cleveland. Everybody would like to see more metal industries people at Philadelphia this fall than have ever been seen at a single Metal Show. You can help make this the biggest and the best ever.

C. S.

(*Continued from p. 6*)

creases in fatigue strength. Road tests confirmed these indications. Also, AISI 5160 steel was fatigue-tested as a cheaper substitute for AISI 9260 (silico-manganese) for flat springs and found to have only slightly lower fatigue strength than the 9260 steel. Production tests confirmed this finding as far as trick applications are concerned.

Rear-axle shafts are machined only over a small part of the shaft length, and the forged surface is retained over the major part of the length. Most fatigue failures occur in the forged surfaces. Mr. Garwood described the results of a fatigue-test study of axle shafts. The stress concentrations imposed by the forged surface on the forged shafts, together with relatively heavy decarburization, give such low fatigue strength that only a minor additional fatigue strength reduction results from increased stress concentration and reduced surface strength. By induction hardening an AISI 1033 axle shaft, an increase of 72% was obtained over that obtained by shot peening a quenched and tempered alloy steel axle shaft.

On the basis of laboratory tests, a lightweight axle was designed that proved successful in subsequent road tests. The savings accomplished by reducing the material weight more than compensated for the additional cost of shot peening.

Winners of N.I.A.A. Awards Announced

The Display of the Carboloy Department of the General Electric Co. at the National Metal Show and World Metallurgical Congress in Detroit Last October Was the Winner of the First Prize Award in the National Industrial Advertising Assoc.'s Exhibits Awards. The second prize was awarded to Detroit Edison Co., which also exhibited at the National Metal Show. Carboloy's attractive display was divided into three principal areas, each devoted to the subject it was promoting

The National Industrial Advertising Association has announced that the Carboloy Department of the General Electric Co., and the Detroit Edison Co., were awarded first and second prize awards, respectively, for their exhibits at the World Metallurgical Congress and National Metal Show in Detroit last October.

The winners reported their reasons for picking that particular show for their exhibits, as follows:

CARBOLOY — The World Metallurgical Congress and the National Metal Show were the first major chance to make a complete presentation of our new metals and newest applications, hence the first opportunity to publicize "Carboloy Created-Metals" with impact in the minds of some of the world's most outstanding metallurgists. It was the first World Metallurgical Congress ever to be held in conjunction with the regular Metal Show; suppliers would attend from all over the globe and be receptive to our information; timing was perfect for our broad sales plans; and finally, the Exposition was on our home grounds. We decided to give it everything we had.

DETROIT EDISON CO. — When Detroit was selected as the site of the 1951 National Metal Exposition, we were eager to take exhibit space primarily because the National Metal Show is big business. Registered attendance over the past 32 years indicates that industry, from almost every state in the country, is represented by thousands of top management executives. These are the people we try to reach with our story of southeastern Michigan's industrial advantages. Because it was a local show, and with Detroit the metalworking center of the world, we knew that many of our own industrial customers would be visiting the exhibits. This offered us an opportunity to strengthen our customer relations by reviewing with these customers the advantages of being located in our service area. By participating in the Show, we gain the good will of our metalworking customers who, through the American Society for Metals, sponsor the Exposition. And, the National Metal Exposition is a recognized factor in the planning and execution of many a year-round industrial advertising promotion program.

Minnesota Chapter Hears Discussion on Metal Spring Performance

Reported by Knox A. Powell

Research Engineer
Minneapolis-Moline Co.

Otto R. Hills, chief engineer of the W. D. Gibson Co., Chicago, spoke on "Springs" at the May meeting of the Minnesota Chapter.

Practically every mechanical device depends upon springs of some sort, Mr. Hills stated. Springs lose their identity in assembly, and the spring industry has remained a jobbing industry without any large manufacturers to support extended publicized research. Wood, glass, synthetic resin, and rubber springs are all widely used, the first since earliest human existence.

Metal spring performance depends upon the surface condition of the wire as movement and stress are greatest at the maximum section radius. The modulus of elasticity governs the loading rate; hardness controls the maximum load.

Surface defects like tears and rust spots cause local stress concentrations that reduce fatigue life. Beneficial stresses produced by shotblasting or presetting allow working spring material to a greater depth before passing the elastic limit at the surface. Springs may also be made of alloy material to provide different characteristics. Cold wound springs that are not stress relieved may fail due to the spring taking set.

The equipment designer should not take spring characteristics for granted, but should give springs the primary design consideration they deserve, Mr. Hills said. Design springs of standard wire sizes wherever possible. Brass and bronze wire go by Brown & Sharpe gage, music wire by the American Music & Wire Gage, and flat stock by the Birmingham or Stubbs gage. Carbon steel and alloy steel wire are drawn to Washburn and Moen gage. Do not specify springs to close free dimensions or the cost will be prohibitive.

Spring materials may have temperature range characteristics to suit high or low temperature operation. They may have stainless characteristics to resist attack by various atmospheres and chemical media. Springs may be plated or otherwise coated for protection or appearance.

Plating of springs tends to cause hydrogen embrittlement, said Mr. Hills, and requires careful treatment by the plater, and postplate roasting to drive off the hydrogen.

Ryerson Holds Open House at Enlarged Plant

Some 2600 customers, friends, and well-wishers visited the St. Louis plant of Joseph T. Ryerson & Son, Inc., steel distributors, on June 13 when the company held open house to celebrate completion of a large addition to its steel service facilities. The addition to the plant was started in March 1951, and consists of three spans, all heated and completely crane served, providing 50,000 sq. ft. of additional warehouse space.

Total plant and office space of the enlarged plant is now approximately 161,000 sq. ft.

Long-Time Member Dies

Burt French, 52, for nearly 20 years a sales engineer with Holcroft & Co., died in Detroit in July.

American Society for Metals

Tentative Technical Program
National Metal Congress
Morning Sessions—Benjamin Franklin Hotel
Afternoon Sessions—Convention Hall

Monday, Oct. 20

9:30 a. m.

HIGH-TEMPERATURE PHASES

Microconstituents in High-Temperature Alloys, by H. J. Beattie, Jr. Physicist, and F. L. VerSnyder, Metallurgist, General Electric Co., Thomson Laboratory.

Sigma Formation and Its Effect on the Impact Properties of Iron-Nickel-Chromium Alloys, by A. M. Talbot and D. E. Furman, Research Laboratory, International Nickel Co., Inc.

Mechanism of the Carburization of Some Stainless Steels, by J. B. Giacobbe, Metallurgist, Superior Tube Co.

The Electrolytic Separation and Some Properties of Austenite and Sigma in 18-8-3-1 Chromium-Nickel-Molybdenum-Titanium Steel, by T. P. Hoar, Dept. of Metallurgy, University of Cambridge, England, and K. W. J. Bowen, Research Dept., Imperial Chemical Industries, Birmingham, England.

2:00 p. m.

CREEP, RUPTURE AND RECRYSTALLIZATION

Creep-Rupture and Recrystallization of Monel from 700-1700° F., by N. J. Grant, Associate Professor, and A. G. Bucklin, Dept. of Metallurgy, Massachusetts Institute of Technology.

Influence of Grain Size on High-Temperature Properties of Monel, by Paul Shahinian and J. R. Lane, Metallurgical Division, Naval Research Laboratory.

Creep and Rupture of Chromium-Nickel Austenitic Stainless Steels, by E. J. Dulis, G. V. Smith and E. G. Houston, Research Laboratory, United States Steel Co.

Recrystallization and Grain Growth in Alpha Brass, by S. L. Channon, Kaiser Aluminum and Chemical Corp., and H. L. Walker, Head, Dept. of Mining and Metallurgical Engineering, University of Illinois.

Tuesday, Oct. 21

9:30 a. m.

PHASE TRANSFORMATION

The Effect of Composition on the Temperature of Spontaneous Transformation of Austenite to Martensite in 18-8 Type Stainless Steel, by G. H. Eichelman, Metallurgist, American Brass Co., and F. C. Hull, Manager, Metallurgical Section, Westinghouse Electric Corp.

The Effect of Silicon on the Tempering of Martensite, by A. G. Allten and P. Payson, Assistant Director of Research, Crucible Steel Co. of America.

The Mechanism and Kinetics of the First Stage of Tempering, by C. S. Roberts, Metallurgical Laboratories, Dow Chemical Co., B. L. Averbach, Assistant Professor, and M. Cohen, Professor of Physical Metallurgy, Massachusetts Institute of Technology.

The Order-Disorder Transformation Viewed as a Classical Phase Change, by F. N. Rhines, Professor of Metallurgy, and J. B. Newkirk, Carnegie Institute of Technology.

2:00 p. m.

HARDENABILITY

An End-Quench Test for Determining the Hardenability of Carburized Steels, by F. X. Kayser, Research Metallurgist, and R. F. Thomson, Head, Metallurgy Dept., Research Laboratories Div., General Motors Corp.

The Influence of Boron on Case Hardenability in Alloy Carburizing Steels, by C. F. Jatczak, Research Metallurgist, and E. S. Rowland, Chief Metallurgical Engineer, Timken Roller Bearing Co.

Effect of Carbon Content on 18-4-1 High Speed Steel, by A. H. Grobe, Research Metallurgist, and G. A. Roberts, Chief Metallurgist, Vanadium Steel Co.

Correlation of Machinability With Inclusion Characteristics in Resulphurized Bessemer Steels, by L. H. VanVlack, Process Metallurgist, United States Steel Co.

Wednesday, Oct. 22

9:30 a. m.

ASM ANNUAL MEETING

Edward DeMille Campbell Memorial Lecture by Dr. Cyril Stanley Smith, Director, Institute for the Study of Metals, Chicago

2:00 p. m.

A Study of the Mechanism of the Delayed Yield Phenomenon, by T. Vreeland, Jr., D. S. Wood and D. S. Clark, Dept. of Mechanical Engineering, California Institute of Technology.

Determination of Oxygen in Metals and Metal Oxides by the Isotopic Method, by A. D. Kirshenbaum and A. V. Grosse, Research Institute of Temple University.

The Indium-Arsenic System, by T. S. Liu, Horizons, Inc., and E. A. Peretti, Acting Head, Dept. of Metallurgy, University of Notre Dame.

Thursday, Oct. 23

9:30 a. m.

MECHANICAL PROPERTIES

The Effect of Quenching and Tempering on Residual Stresses in Manganese Oil-Hardening Tool Steel, by H. J. Snyder, Research Associate, Mellon Institute of Industrial Research.

X-Ray Measurement of Residual Stress in Hardened High Carbon Steel, by A. L. Christenson, Research Metallurgist, and E. S. Rowland, Chief Metallurgical Engineer, Timken Roller Bearing Co.

The Endurance Limit of Temper Brittle Steel, by R. D. Chapman, Research Metallurgist, and W. E. Jominy, Chief Metallurgist, Research, Chrysler Corp.

Plastic Stress-Strain Relations of Alcoa 14S-T6 for Variable Biaxial Stress Ratios, by Joseph Marin, Professor of Engineering Mechanics, L. W. Hu and J. F. Hamburg, Dept. of Engineering Mechanics, Pennsylvania State College.

2:00 p. m.

TEMPER BRITTLENESS

The Effect of Various Heat Treating Cycles Upon Temper Brittleness, by J. D. Jaffe and D. C. Buffum, Watertown Arsenal Laboratory, and F. L. Carr, National Research Corp.

Effect of Hardness on the Level of the Impact Energy Curve for Temper Brittle and Unembrittled Steel, by F. L. Carr, National Research Corp., M. Goldman, Battelle Memorial Institute, L. D. Jaffe and D. C. Buffum, Watertown Arsenal Laboratory.

Transverse Mechanical Properties in an S.A.E. 1045 Forging Steel, by A. H. Grobe, Research Metallurgist, Vanadium Alloys Steel Co., Cyril Wells, Member of Staff, and R. F. Mehl, Director, Metals Research Laboratory, Carnegie Institute of Technology.

The Determination of the Plastic Constants of Metals by the Ultrasonic Pulse Technique, by M. B. Reynolds, Knolls Atomic Power Laboratory, General Electric Co.

(Continued on next page)

Avoid Delay at the Registration Desk

See page 63 for Advance Registration Coupon; your badge giving admittance to the National Metal Exposition will be mailed to you.

(American Society for Metals, Cont'd.)

Friday, Oct. 24

9:30 a. m.

ELEVATED TEMPERATURE PROPERTIES

Temperature Dependence of the Hardness of Pure Metals, by J. W. Westbrook, The Knolls, Research Laboratory, General Electric Co.

Hardness of Various Steels at Elevated Temperatures, by F. Garofalo, P. R. Malenock and G. V. Smith, Research Laboratory, United States Steel Co.

Some Properties of a Nodular Iron at Elevated Temperatures, by M. S. Saunders, Graduate Student, and M. J. Sinnott, Associate Professor of Chemical and Metallurgical Engineering, University of Michigan.

Accelerated Strain Aging of Commercial Sheet Steels, by L. R. Schoenberger and E. J. Paliwoda, Research Engineer, Jones and Laughlin Steel Corp.

Metals Section Regional Meeting

SPECIAL LIBRARIES ASSOCIATION

Philadelphia, Oct. 20-21, 1952

Monday Afternoon, Oct. 20

NEW HORIZONS IN LITERATURE SEARCHING

International Cooperation in Metallurgical Literature Classification; Report of Interim Committee on Literature Classification, by Marjorie R. Hyslop, Chairman.

Papers describing mechanical methods for literature handling (Complete program to be announced.)

Open Discussion.

Tuesday Morning, Oct. 21

Research Reports, Their Organization and Availability, by I. A. Warheit, Argonne National Laboratory.

How to Obtain Unclassified Material From the Government, by Eugene B. Jackson, N.A.C.A., Washington.

Foreign Language Literature and the New International Journal, by John H. Hollomon, General Electric Co.

Tuesday Afternoon

Foreign Language Literature in Translation, by Frederica M. Weitlauf, Timken Roller Bearing Co.

Technical Research Versus Librarians, by Iver Igelsrud, Battelle Memorial Institute.

Selling Your Library to Management, by M. H. Bigelow, Director of Technical Services, Plaskon Co., Inc.

American Welding Society

33rd Annual Meeting

Hotel Bellevue-Stratford

Philadelphia, Oct. 20-24, 1952

Monday, Oct. 20

10:30 a. m.

ADAMS LECTURE

The Welding and Brazing of Titanium Alloys, by C. B. Voldrich, Battelle Memorial Institute.

2:00 p. m.

FABRICATING PROCEDURES

Fusion Welding Techniques for Jet Aircraft Components, by Arnold S. Rose and Morton A. Braun, I.T.E. Circuit Breaker Co.

Should Preheat Be Substituted for High-Temperature Stress Relief in the Codes?, by E. Paul DeGarmo, University of California.

Chromium-Recovery During Submerged-Arc Welding, by James G. Kerr and David A. Elmer, C. R. Braun & Co.

RESISTANCE WELDING

Corrosion of Structural Spot Welds, by B. Karnisky, E. P. Gruca and E. Kinelski, Pullman-Standard Car Manufacturing Co.

Maintenance of Resistance Welders in High-Speed Assembly Lines, by James F. Salatin and O. D. Etchison, Delco-Remy Div., General Motors Corp.

HARD FACING AND FLAME HARDENING

Hard-Facing Alloys of the Chromium Carbide Type, by Howard S. Avery and Henry J. Chapin, American Brake Shoe Co.

Selection and Evaluation of Methods of Hard Facing, by Jack J. Barry, Air Reduction Sales Co.

Flame Hardening of Large Diameter, Thin-Wall Cylindrical Shells, by G. S. Wing and G. A. Weber, M. W. Kellogg Co.

Tuesday, Oct. 21

9:30 a. m.

RESISTANCE WELDING

Calculation of Spotweld Properties, by Julius Heuschkel, Westinghouse Electric Corp.

Temperature Distribution During Flash Welding of Steel—Part II, by Ernest F. Nippes, Warren F. Savage, John J. McCarthy and Sheridan S. Smith, Rensselaer Polytechnic Institute.

Spot Welded Titanium-Base Alloy Sheet, by M. L. Begeman and Frank W. McBee, Jr., University of Texas.

Spot Welding Magnesium With Three Phase Low-Frequency Equipment, by Dean L. Knight and Paul Thorne, National Electric Welding Machines Co., and Paul Klain, Dow Chemical Co.

WELDABILITY

Further Studies of the Crack Sensitivity of Aircraft Steels, by A. W. Steinberger and J. Stoop, Curtiss Wright Corp., Propeller Div.

Effect of Geometry on Stresses in Circular Patch Specimen, by Alan V. Levy and Harry E. Kennedy, University of California.

Evaluation of the Circular Patch Weld Test, by John E. Hackett and L. O. Seaborn, University of California.

Relationship of Welding Technique to Penetration and Dilution, by Clarence E. Jackson and Arthur E. Shrubsall, Union Carbide and Carbon Research Laboratories, Inc.

STRUCTURAL

The Behavior of Welded Portal Frames, by E. R. Johnston, Lynn S. Beedle, Fritz Engineering Laboratory, Lehigh University, and J. M. Ruzek, C. F. Braun & Co.

Residual Stress and the Compressive Strength of Steel, by Lynn S. Beedle, A. W. Huber, Fritz Engineering Laboratory, Lehigh University, and Bruce G. Johnston, University of Michigan.

How to Save Cost by Designing for Structural Welding, by Alfred E. Pearson, Ingalls Iron Works Co.

Distortion Control in Structural Fabrication, by Gordon Cape and Llewellyn Jehu, Dominion Bridge Co., Ltd.

2:00 p. m.

WELDABILITY

The Effect of Strain Rate on Twinning and Brittle Fracture in Low Carbon Steel, by D. Rosenthal and C. C. Woolsey, Jr., University of California.

Interpretation of Test Data Regarding Brittle Strength and Transition Temperature of Structural Steel, by N. M. Newmark and W. C. Hoeltje, University of Illinois.

Factors Affecting the Structural Steel in Repeated Overloading, by Robert D. Stout, John H. Gross and Dogan Gucer, Lehigh University.

RESISTANCE WELDING

Quality Control of Resistance Welding by Statistical Methods, by J. F. Radford and R. K. Waldvogel, Crosley Div., Avco Manufacturing Corp.

Contact Resistance as Affected by Subdividing the Contact Area, by William B. Kouwenhoven and Clarence W. Little, Jr., Johns Hopkins University.

New Multi-Spot Control Provides Increased Welding Production With Limited Power Supply, by Claude R. Whitney, Jr., Square D Co.

BRAZING AND BRONZE WELDING

New Aspects in Surface Alloying in Brazing and Related Techniques, by Robert Humphrey and Rene D. Wasserman, Eutectic Welding Alloys Corp.

Strength Joints to Steel With Aluminum Bronze Filler Metals, by Willig G. Groth, Ampco Metal, Inc.

4:30 p. m.

EDUCATIONAL LECTURE SERIES

Inert-Gas Metal Arc-Welding Processes, by Walter H. Wooding, Philadelphia Naval Shipyard.

Wednesday, Oct. 22

9:30 a. m.

NONFERROUS

The Semi-Automatic Inert-Gas Metal-Arc Welding of Aluminum Alloys, by Charles T. Gayley, Joseph R. Girini and Walter H. Wooding, Industrial Test Laboratory, Philadelphia Naval Shipyard.

Welding 90-10 Cupro-Nickel by the Inert-Gas Shielded Arc Processes, by L. H. Hawthorne, Revere Copper and Brass, Inc.

Weld Cracking of Aluminum Alloys, by James D. Dowd, Aluminum Co. of America.

WELDABILITY

Relation of Preheating to Low-Temperature Cooling Rate Embrittlement and Microcracking, by A. E. Flanigan and T. Micleu, University of California.

Initiation and Propagation of Brittle Fracture, by Peter P. Puzak, Earl W. Eschbacher and William S. Pellini, Naval Research Laboratory.

The Continuous Cooling Transformation of Weld Heat-Affected Zones, by W. R. Apblett, L. K. Poole and W. S. Pellini, Naval Research Laboratory.

The Determination of Optimum Welding Conditions for the Automatic Welding of High-Hardenability Steels, With or Without Preheat, by C. R. McKinsey and J. F. Collins, Union Carbide & Carbon Research Laboratories, Inc.

2:00 p. m.

WELDABILITY

Embrittlement of High-Strength Ferritic Welds, by Peter P. Puzak and William S. Pellini, Naval Research Laboratory.

Temper Brittleness in Low Alloy Weld Metal, by Richard P. Wentworth and Hallock C. Campbell, Arcos Corp.

The Effects of Electrodes and Welding Conditions on the Ductility of Arc-Welded Mild Steels, by Ernest F. Nippes and Alexander Lesnewich, Rensselaer Polytechnic Institute.

NONFERROUS

The Strength and Ductility of Welds in Aluminum Alloy Plate, by F. M. Howell and F. G. Nelson, Jr., Aluminum Research Labortories.

Factors Which Determine the Performance of Aluminum Alloy Weldments, by W. R. Apblett, C. R. Felmley and W. S. Pellini, Naval Research Laboratory.

Welding and Forming of Titanium, by Francis H. Stevenson, Aerojet Engineering Corp.

MAINTENANCE AND GAS CUTTING

Wear and Operation Problems in Maintenance, by Frank J. Gaydos, United States Steel Co., Gary Works.

Effect of Oxygen Cutting on Alloy Steel, by F. C. Saacke, Air Reduction Co., Inc.

4:30 p. m.

EDUCATIONAL LECTURE SERIES

Inert Gas Metal Arc-Welding Processes, by Walter H. Wooding, Philadelphia Naval Shipyard.

Thursday, Oct. 23

9:30 a. m.

INERT ARC WELDING

A Comparison of Shielding Mixtures for Gas Shielded Arc Welding, by John W. Cunningham, Air Reduction Sales Co.

Production Welding of Mild and Low-Alloy Steels by Gas Shielded Arc Welding, by John H. Berryman, Air Reduction Sales Co.

Porosity in Mild Steel Weld Metal, by Donald Warren, E. I. du Pont de Nemours & Co., and R. D. Stout, Lehigh University.

BRAZING

Advanced Information for the Brazing Operator, by E. F. Davis, Westinghouse Electric Corp.

Joint Design for Brazing, by W. J. Van Hatten, General Electric Co.

Technical Aspects of Soldering Practices, by R. M. MacIntosh, Tin Research Institute, Inc.

Production Brazing, by J. R. Wirt, Delco-Remy Div., General Motors Corp.

MARINE CONSTRUCTION

New Rules for Welding Low-Alloy Ferritic Pipe Material, by Charles F. Perry, Commander, U.S.C.G.

Evaluation of Brittle Failure Research, by Paul Ffield and E. Sweeney, Bethlehem Steel Co.

An Investigation on Peening, by G. W. Place, American Bureau of Shipping.

Friday, Oct. 24

9:30 a. m.

PIPE

Pipe Welding in the Petroleum Refining Industry, by Albert W. Zeuthen, Socony-Vacuum Oil Co.

The Arc Welding of Low-Chromium Molybdenum Steel Pipe, by J. Bland, L. J. Privoznik and F. J. Winsar, Standard Oil Co. of Indiana.

Effect of Stresses and Stress Relief on the Bursting Strength of Circumferentially Welded Pipe, by L. J. Privoznik and F. J. Winsar, Standard Oil Co. of Indiana.

INERT ARC

Inert Gas Shielding of the Metallic Arc, by William L. Green and Robert J. Krieger, Ohio State University.

Gas Flow Requirements for Inert Gas Arc Shielding, by Glenn J. Gibson, Air Reduction Co., Inc.

Shielded Arc Welding of Jet Engine Components, by K. H. Koopman, Linde Air Products Co.

MARINE CONSTRUCTION

Observation on Experience With Welded Ships, by David P. Brown, American Bureau of Shipping.

Prevention of Marine Corrosion by Metallizing Systems, by Howard Vanderpool, Metallizing Engineering Co.

Failures and Defects Encountered in Welded Ship Construction, by Ralph D. Bradway, New York Shipbuilding Corp.

Institute of Metals Division A.I.M.E.

Adelphia Hotel,
Oct. 20 through 22, 1952

Monday, Oct. 20

9:00 a. m.

THERMODYNAMICS AND THERMAL PROPERTIES HIGH-TEMPERATURE ALLOYS

2:00 p. m.

RESEARCH IN PROGRESS

Tuesday, Oct. 21

All Day

SYMPOSIUM ON TITANIUM AND TITANIUM ALLOYS

9:00 a. m.

DEFORMATION

2:00 p. m.

PHYSICAL PROPERTIES

6:00 p. m.

COCKTAIL PARTY

ANNUAL FALL DINNER

Wednesday, Oct. 21

2:00 p. m.

CONSTITUTIONAL DIAGRAMS

Society for Non-Destructive Testing

Hotel Sylvania, Philadelphia

Oct. 20 through 23, 1952

Monday Morning, Oct. 20

LOWERING PRODUCTION COSTS WITH MODERN X-RAY EQUIPMENT

The General Electric Industrial Betatron, by T. W. Dietze, General Engineering Laboratory, General Electric Co.

Modern Techniques in Precision High-Voltage Radiography, by E. Alfred Burrill, High-Voltage Engineering Corp.

Uses of Low-Voltage X-Ray Tubes With Thin Beryllium Windows in Nondestructive Testing, by Tom H. Rogers, Machlett Laboratories.

The Current Status of the Picker-Polaroid Process for One-Minute Radiography in the Industrial Field, by W. B. Pyle, Picker X-Ray Corp.

Alternate: **Direct Exposure Enlargement Techniques in Radiography and Fluoroscopy Utilizing Fractional-Focus X-Ray Tubes,** by Leo C. Kotraschek, North American Philips Co. Inc.

Monday Afternoon, Oct. 20

NEW TECHNIQUES FOR APPLYING X-RAY NONDESTRUCTIVE TESTS

Reduction of Exposure Time in Gamma Radiography, by J. J. Hirschfield and D. T. O'Connor, Naval Ordnance Laboratory.

Techniques Used in Measuring Uniformity of Materials by Means of Gamma Radiation, by Lawrence R. Megill and John N. Harris, Los Alamos, N. M.

Some Industrial Applications of Microradiography, by S. Goldspiel and F. Bernstein, New York Naval Shipyard.

Gaging Tin Coatings in the Steel Industry by X-Ray Fluorescence Analysis, by C. J. Woods, North American Philips Co., Inc.

Alternate: **Application of Fluorescence X-Rays to Metallurgical Microradiography,** by Herman E. Seeman and H. R. Splettstosser, Eastman Kodak Co.

Alternate: **Radiography With Iridium-192,** by James V. Rigbey, Ford Motor Co. of Canada.

Tuesday Morning, Oct. 21

CONTROL AND INTERPRETATION IN X-RAY NONDESTRUCTIVE TESTING

Film Characteristics as Applied to Radiation Monitoring, by George Corney, Eastman Kodak Co.

Problems of Mechanical Film Development, by Donald F. Hauptman and Gerold H. Tenney, Los Alomas, N. M.

Various Penetrameter Types and Their Limitations, by Norman C. Miller and Gerold H. Tenney, Los Alamos, N. M.

Interpretation of Radiographs of Aluminum and Magnesium Castings, by J. J. Pierce, Naval Ordnance Laboratory.

Interpretation of Fluoroscopic Images of Aluminum and Magnesium Castings, by D. T. O'Connor and D. Polaasky, Naval Ordnance Laboratory.

Alternate: **Semi-Empirical Equation for the Spectral Energy Distribution in X-Ray Beams,** by Charles R. Emigh, Los Alamos, N. M.

Tuesday Afternoon, Oct. 21

THE ECONOMICS OF NONDESTRUCTIVE TESTING TO LOWER PRODUCTION COSTS

Economic Factors in Nondestructive Testing, by W. E. Thomas, Vice-President, Magnaflux Corp.

Quality Control Application of Nondestructive Tests in the Airframe Industries Which Will Effectively Lower Production Costs, by B. W. Clawson, Quality Manager, Douglas Aircraft, Inc.

The Use of Nondestructive Test Methods in Heavy Manufacture, by James A. Pratt, Metallurgical Engineer, Westinghouse Electric Corp.

Alternate: **Economics of Nondestructive Testing in European Industry,** speaker to be announced.

Tuesday Evening, Oct. 21

ANNUAL OFFICERS' RECEPTION AND SOCIAL MEETING

Wednesday Morning, Oct. 22

NEW METHODS AND APPLICATIONS OF ULTRASONIC NONDESTRUCTIVE TESTS TO LOWER INDUSTRIAL PRODUCTION COSTS

An Evaluation of New Immersion Ultrasonic Testing Techniques, by Leslie W. Ball, U. S. Naval Ordnance Test Station.

Ultrasonic Examinations of Weldments and the Establishment of Safe Acceptable Limits for Defects, by Frank C. Parker, Carbide and Carbon Chemicals Co.

Ultrasonic Equipment for High-Precision Thickness Measurements, by Peter K. Bloch, Vice-President, Branson Instrument Co.

Geophysics—Its Relation to Nondestructive Testing, by Peter Dehlinger and Sam Wenk, Battelle Memorial Institute.

Alternate: **Economic Industrial Applications of the Metroscope,** by Mr. Mann, Walter Kidde and Co.

Alternate: **Future Trends in Industrial Ultrasonic Testing,** by William I. Bendz, Sperry Products, Inc.

Wednesday Afternoon, Oct. 22

NEW ELECTROMAGNETIC NONDESTRUCTIVE TESTS TO LOWER PRODUCTION COSTS

Industrial Evaluation of Search Coil Flaw Detection Techniques, by Carleton E. Hastings, Watertown Arsenal.

A Metal Comparator for the Inspection and Classification of Metals, by B. M. Smith, General Engineering Laboratory, General Electric Co.

The Application of Foerster-Type Instruments in American Industry, by Representative of Magnaflux Corp.

Alternate: **New Nondestructive Test Instruments Developed by the Institut-fur-Dr. Foerster,** by Friedrich Foerster, Institut-fur-Dr. Foerster, Germany.

Thursday Morning, Oct. 23

USING LIQUID-PENETRANT AND ELECTRICAL NONDESTRUCTIVE TEST METHODS TO LOWER INDUSTRIAL PRODUCTION COSTS

Comparison of Materials for Liquid Penetrant Inspection, by Hamilton Migel and Taber de Forest, Magnaflux Corp.

Lowering Production Costs With Dy-Chek and Chek-Spek Dye Penetrants, by Representative of Turco Products, Inc.

The Application of Wire-Resistance Strain Gages to Lower Production Costs, by Francis G. Tatnall, Baldwin-Lima-Hamilton Corp.

Alternate: **The Measurement of Ionization in Dielectric Structures—a New Nondestructive Test for Electrical Insulating Materials,** by D. A. Lupfer, General Electric Co.

Thursday Afternoon, Oct. 23

MEHL HONOR LECTURE AND ANNUAL BUSINESS MEETING

Society for Nondestructive Testing Annual Lecture Honoring Dr. Robert F. Mehl, by Donald T. O'Connor, Chief, Radiology Section, Naval Ordnance Laboratory.

ANNUAL BUSINESS MEETING

Confidential Sessions on Refractory-Type Materials for High-Temperature Applications

Carter Hotel
Cleveland, Ohio
Nov. 24-25, 1952

All members and friends of the American Society for Metals are invited to make application to attend the two-day secret conference on Refractory-Type Materials for High-Temperature Applications to be held under the auspices of the Society at the Carter Hotel, Cleveland, on Monday and Tuesday, Nov. 24 and 25, 1952. The conference is open to all individuals who can comply and who file their security qualifications in advance. (Application form appears on p. 15 of this issue.)

The meeting is being held to provide an opportunity for the presentation and discussion of classified information that qualified engineers need to know in the performance of their jobs and in the best interests of national defense.

Security regulations require that attendance at this meeting must be limited to citizens of the United States who possess evidence of current clearance through "confidential" by the Air Force, Navy, Research and Development Board, Atomic Energy, or other credited U. S. Government Agency.

To attend, the application form on p. 15 must be filled out and returned to A. S. M. headquarters in Cleveland through the military security officer having cognizance over the plant or activity and contract with which the applicant is connected.

Those attending the conference are requested to make their hotel reservations direct with Miss Betty Maus, Reservation Manager, Hotel Carter, 1012 Prospect Ave., Cleveland 15, Ohio.

The enrollment fee of $10.00 will include two luncheons and gratuities plus transportation to and from N.A.C.A. Laboratory and the Hotel Carter.

The preliminary program for the sessions follows:

Nov. 24—9:30 to 12:00

MOLYBDENUM AND ITS ALLOYS

Arc-Cast Molybdenum and Molybdenum-Base Alloys—Their Manufacture, Fabrication and Properties. (Speaker to be announced)

Sintered Molybdenum and Molybdenum-Base Alloys—Their Manufacture, Fabrication and Properties, by Howard Scott, Westinghouse Electric Co.

Related discussion by representatives of Fansteel Metallurgical Corp., Wright Aeronautical Co., N.A.C.A., and General Electric Co., followed by a panel session.*

The Elevated Temperature Properties of Molybdenum and Molybdenum-Base Alloys, by Howard Cross, Battelle Memorial Institute.

Protective Coatings for Molybdenum or Molybdenum-Base Alloys, by Ralph Wehrmann, Research Chemist, Fansteel Metallurgical Corp.

Related discussion by representatives of Thompson Products Inc., Bureau of Standards, Climax Molybdenum Corp., and Battelle Memorial Institute, followed by a panel session.

1:30—5:00 p. m.

CERAMICS AND INTERMETALLICS

Ceramic Bodies for Use at Elevated Temperatures and Their Evaluations, by R. F. Geller, National Bureau of Standards.

Related discussion by representatives of Rutgers University, Carborundum Co., Ohio State University, Stupakoff Ceramic and Manufacturing Co., Pennsylvania State College, and Battelle Memorial Institute, followed by a panel session.

Intermetallics—New Type Refractory Alloys, (Speaker to be announced.)

Molybdenum Disilicide, Properties at Elevated Temperatures, by W. Maxwell, N.A.C.A.

Titanium Disilicide, Properties at Elevated Temperatures, by R. Long, N.A.C.A.

Combinations of Intermetallics and/or Ceramics. (Speaker to be announced).

Related discussion by representatives of American Electro Metals, and Rensselaer Polytechnic Institute, followed by a panel session.

**Panel sessions will be made up of chairman as moderator and all speakers*

8:00—10:00 p. m.

USES AND APPLICATION OF REFRACTORY-TYPE MATERIALS

Problems Relating to Usage of Refractory Materials in High-Temperature Applications, by J. B. Johnson and R. Paris, W.A.D.C.

Turbine Operation With Refractory-Type Materials, by G. C. Duetsch, N.A.C.A.

Related discussion by representatives of Bell Aircraft, Pratt & Whitney Aircraft, Allison Div. of General Motors Corp., Thompson Products, and N.A.C.A., followed by a panel session.

Nov. 25—9:00 to 12:00

CERAMICS AND INTERMETALLICS WITH METAL ADDITIONS

Chairman: J. T. Norton, Massachusetts Institute of Technology

Theoretical Structure of Refractory Materials for Elevated Temperature Applications, by John T. Norton, Massachusetts Institute of Technology.

Additions of Metals or Alloys to Base Ceramic-Type Materials. (Speaker to be announced).

Related discussion by representatives of N.A.C.A., New York State College of Ceramics, Haynes-Stellite Co., and University of Illinois, followed by a panel session.

New Developments on Titanium Carbide Compositions and Properties. (Speaker to be announced).

Elevated Temperature Properties of Zirconium Boride Alloys. (Speaker to be announced).

Alloys of Molybdenum Disilicide, by H. A. DeVincentis, N.A.C.A.

Related discussion by representatives of Fansteel Metallurgical Corp., Battelle Memorial Institute, Firth-Sterling Steel Co., and Office of Naval Research, followed by a panel session.

2:15—4:30 p m.

Tour and Inspection of N.A.C.A.

COMMITTEE:

Roger A. Long, Chief, Metallurgical Branch, Na-

(Continued on Page 14)

Confidential Conference Committee *(Continued)*

tional Advisory Committee for Aeronautics. (Committee Chairman).
Ray T. Bayless, Assistant Secretary, American Society for Metals. (Committee Secretary).
G. M. Ault (Representing B. Pinkel), N.A.C.A. Laboratory.
W. L. Badger, General Electric Co., Gas Turbine Div.
K. M. Bartlett, Thompson Products, Inc. (Represented by E. Pekarek.)
Howard Cross, Battelle Memorial Institute.
Arthur W. F. Green, Allison Div., General Motors Corp.
J. J. Harwood, Office of Naval Research.
Willson Hunter, N.A.C.A.
J. B. Johnson, Head, Metallurgical Group of Flight Research Laboratory, Wright-Patterson Air Force Base.
Benjamin Pinkel, Division Chief of Materials and Thermodynamics Div., N.A.C.A.
John C. Redmond, Kennametal, Inc.
Howard Scott, Westinghouse Electric Research Laboratories.
L. F. Yntema, Director of Research, Fansteel Metallurgical Corp.

THIRTY YEARS AGO

The May 1922 issue of the *Transactions* of the American Society for Steel Treating (predecessor of A.S.M.) carries a report of a talk on "Carburizing" presented before the Lehigh Valley Chapter by B. F. SHEPHERD, assistant superintendent of heat treating at Ingersoll-Rand Co. (now chief metallurgist and an A.S.M. past president). "The paper proved to be of great interest because much of the material presented was entirely original," the report states, "particularly a method of presenting the iron-carbon diagram which portrays the effect of carburizing on the microstructure of steel in a unique manner."

— 30 —

A news item in the same issue states that the Bureau of Mines and Bureau of Standards were planning a joint investigation of practice in the heat treatment of drill steels. The survey was under the immediate supervision of D. A. LYON, chief metallurgist of the Bureau of Mines, and G. K. BURGESS† of the Bureau of Standards (A.S.M. president in 1923).

— 30 —

An obituary and eulogy of HENRY MARION HOWE, who died on May 14, 1922, appears in the *Transactions*. Dr. Howe, famed professor of metallurgy at Columbia University, was at that time an honorary member of the Society and was later memorialized by the establishment of the Henry Marion Howe Medal.

— 30 —

The report of the national nominating committee lists T. D. LYNCH† of Westinghouse Electric & Mfg. Co. for president; W. S. BIDLE,† president of W. S. Bidle Co., for vice-president; W. H. EISENMAN for secretary; and SAMUEL M. HAVENS,† assistant treasurer and manager of Ingalls-Shepard Division, Wyman-Gordon Co., for national director.

— 30 —

Among new members listed in the June 1922 issue are HENRY G. KESHIAN of Waterbury Mfg. Co. (now retired and an A.S.M. past national trustee), and VINCENT T. MALCOLM, now director of research, Chapman Valve Mfg. Co., Indian Orchard, Mass., and inventor of the process known as Chapmanizing.

— 30 —

New officers of the Cleveland Chapter in 1922 included H. M. BOYLSTON,† professor of metallurgy at Case School of Applied Science, chairman; RAY T. BAYLESS, editor of the *Transactions*, vice-chairman; and DON M. GURNEY of Warner & Swasey Co., secretary-treasurer.

— 30 —

A. H. D'ARCAMBAL of Pratt & Whitney Co. (also destined to become a national president) was elected to lead the Hartford Chapter, and H. KENNETH BRIGGS of Minneapolis Electric Steel Casting Co. (now sales engineer for Miller & Co., Chicago, and one-time assistant secretary of the Society), was chairman for North West (present Minnesota Chapter).

— 30 —

HENRY LECHATELIER,† professor of metallurgy in France and distinguished metallographer, was elected to honorary membership in the Society in 1922.

— 30 —

Authors of papers presented at the Detroit convention in 1922 included R. B. SCHENCK, metallurgical engineer, Buick Motor Co. (now retired) on "Heat Treating in Lead"; J. B. JOHNSON, acting chief, War Department Air Service, McCook Field, Dayton (now head of the metallurgical group of the Flight Research Laboratory, Wright-Patterson Air Force Base, and a present A.S.M. national trustee) on "Some Failures in Aircraft Plane and Engine Parts"; and HORACE C. KNERR of Metlab, Inc. (currently chairman of the A.S.M. Vocational Education Committee), on "Heat Treatment and Properties of Duralumin".

†Deceased

A. S. M. Annual Meeting

To the Members of the A.S.M.

This is your official notice that the annual meeting of the American Society for Metals will be held in the Benjamin Franklin Hotel, Philadelphia, on Wednesday morning, Oct. 22, 1952. All members of the Society in good standing are privileged to attend and vote.

W. H. EISENMAN, Secretary
Cleveland, Ohio
August 1, 1952

Compliments

To ALFRED L. BOEGEHOLD, assistant to the general manager, and ROBERT F. THOMSON, head of the General Motors research metallurgy department, on their speeches inaugurating the new General Motors Corp. metallurgy building, the first completed structure in the Research Laboratories group.

♦ ♦ ♦

To RICHARD F. HARVEY, chief metallurgist, Brown & Sharpe Manufacturing Co., on his article "Early History of Martempering" which appeared in a recent issue of the Ajax Electric Co.'s *Tips & Trends*. Mr. Harvey is a past chairman of the Rhode Island Chapter and one of the early investigators of the martempering process.

♦ ♦ ♦

To W. P. DAVEY, department of physics, Pennsylvania State College, and to J. J. KANTER, directing engineering laboratories, Crane Co., upon their receipt of the American Society for Testing Materials 1952 Awards of Merit during the A.S.T.M.'s 50th Anniversary Meeting in June.

Ask Philadelphia Members to Open Homes to Show Visitors

The members of the Philadelphia Chapter are being canvassed to help find 2000 additional rooms for visitors to the National Metal Congress in October. Each member has been asked to specify the number of rooms he has available, or the number of guests he can accommodate in his home. The Chapter has also requested its members to invite personal friends visiting the Congress to stay at their homes, thus releasing hotel rooms for others.

IMPORTANT: TO BE RETURNED TO ASM VIA MILITARY SECURITY OFFICER ONLY

Request for Clearance to Attend the

CONFIDENTIAL SESSION ON "REFRACTORY-TYPE MATERIALS FOR HIGH-TEMPERATURE APPLICATIONS"

Sponsored by the American Society for Metals

MONDAY AND TUESDAY, NOVEMBER 24 and 25, 1952

HOTEL CARTER—RAINBOW ROOM

CLEVELAND, OHIO

American Society for Metals
7301 Euclid Avenue
Cleveland 3, Ohio

ATTENTION: Refractory Materials Committee

Gentlemen:

TO BE FILLED OUT BY APPLICANT

Clearance is requested to attend the above confidential session.

Applicant's Name (print)_____

Birthplace_____ Citizenship_____

If birthplace not U. S., give details_____

_____

Company Affiliation and Address_____

_____

Applicant's Title or Position_____

Applicant's Home Address_____

If you have already been cleared for access to CONFIDENTIAL or higher classification of information please specify

_____

(Air Force, Navy, Research and Development Board, Atomic Energy, etc.)

on_____ in connection with_____

(date) (project or contract number, etc.)

_____

This request is based upon my need to know the information and material to be discussed at this meeting as necessary in the performance of my work and in the best interest of the military or other government services.

DATE_____ APPLICANT'S SIGNATURE_____

TO BE FILLED OUT BY MILITARY SECURITY OFFICER

I hereby confirm clearance of this applicant as indicated above.

DATE_____ (SIGNED)_____

(Military Security Officer having cognizance over applicant's plant or activity and contract)

THIS FORM MUST BE RETURNED **ON OR BEFORE NOVEMBER 15, 1952, VIA MILITARY SECURITY OFFICER** (Navy, Air Force, Research and Development, Atomic Energy, etc.) HAVING COGNIZANCE OVER THE APPLICANT'S PLANT OR ACTIVITY AND CONTRACT.

Security Officer:—When request for clearance has been approved please mail direct to
American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio

(15) AUGUST, 1952

ROSTER OF ASM CHAPTER OFFICERS, 1952-53

AKRON CHAPTER

Chairman—N. C. Jessen, 879 Hartford Ave., Akron 2, Ohio
Vice-Chairman—William H. Lotze, 418 Wayne Ave., Akron 1, Ohio
Secretary—Robert D. Wylie, 696 East Tusc Ave., Barberton, Ohio
Treasurer—Richard F. O'Dea, Peninsular Steel Co., 1045 South High St., Akron 11, Ohio

BALTIMORE CHAPTER

Chairman — Howard L. Sittler, 624 Round Oak Rd., Towson 4, Md.
Vice-Chairman — Robert B. Pond, Johns Hopkins University, Baltimore 18, Md.
Secretary-Treasurer — Donald W. Kalkman, 408 Evesham Ave., Baltimore 12, Md.

BIRMINGHAM CHAPTER

Chairman—Maurice D. Neptune, 1905 Saulter Rd., Birmingham 9, Ala.
Vice-Chairman—James M. Edge, 1421 Bush Blvd., Birmingham, Ala.
Secretary - Treasurer — Edgar A. Brandler, 907-8 Brown-Marx Bldg., Birmingham, Ala.

BOSTON CHAPTER

Chairman—William L. Badger, General Electric Co., Thompson Laboratory, Lynn, Mass.
Vice-Chairman — Morris Cohen, 491 Puritan Rd., Swampscott, Mass.
Secretary-Treasurer—John D. Paine, Jr. 1 Doane St., Marblehead, Mass.

BRITISH COLUMBIA CHAPTER

Chairman—J. A. Underwood, Dominion Oxygen Co., Ltd., 1175 Grant St., Vancouver, B. C.
Vice-Chairman—A. D. Harding, Atlas Steels, Ltd., 714 Cambie St., Vancouver, B. C.
Secretary—D. L. Sprung, Canadian Liquid Air Co., Ltd., 400 West 5th Ave., Vancouver, B. C.
Treasurer—Walter J. Chappell, 1462 Kings Ave., Hollyburn, B. C.

BUFFALO CHAPTER

Chairman—C. M. Offenhauer, P. O. 580, Niagara Falls, N. Y.
Vice-Chairman—George F. Kappelt, 91 Stillwell Ave., Kenmore 17, N. Y.
Secretary — E. M. Galbreath, 198 Parkwood Ave., Kenmore 17, N. Y.
Treasurer—Raymond P. Griffenhagen, 31 Forest Stream Rd., Williamsville, N. Y.

CALUMET CHAPTER

Chairman—James R. Bateman, 2631 38th St., Highland, Ind.
Vice-Chairman—W. W. Hintalla, 812 Arthur St., Gary, Ind.
Secretary—John A. Rassenfoss, 3520 Condit St., Highland, Ind.
Treasurer—J. R. Woodfill, 5265 Hohman Ave., Hammond, Ind.

CANTON-MASSILLON CHAPTER

Chairman — Gordon Meldrum, 1604 Shorb Ave., N. W., Canton 3, Ohio
Vice-Chairman—Daniel J. Girardi, Timken Roller Bearing Co., Canton 6, Ohio
Secretary—L. A. Zeitz, East Ohio Gas Co., Canton, Ohio
Treasurer—Frank J. Welchner, Canton Drop Forging & Manufacturing Co., 207—12th St., S. E., Canton, Ohio

Retiring Chairman, J. W. Spretnak, Second From Left, Professor at Ohio State University, Greets the Newly Elected Officers at the May Meeting of the Columbus Chapter. They are, from left: R. E. Christin, chief metallurgist, Columbus Bolt & Forging Co., who was re-elected secretary; Mr. Spretnak; Earl J. Bleakley, assistant chief metallurgist, Jeffrey Manufacturing Co., the incoming chairman; Arthur B. Westerman, research engineer, Battelle Memorial Institute, new vice-chairman; and Frank H. Beck, research professor, Ohio State University, treasurer

CEDAR RAPIDS CHAPTER

Chairman—Karl E. Henrikson, 4480 Marcy Lane, Apt. 68., Indianapolis 5, Ind.
Vice-Chairman—John Havlicek, 414½ First Ave., N. W., Cedar Rapids, Iowa
Secretary-Treasurer—Edwin V. Zahorik, Sr., 1529 A Ave., N. E., Cedar Rapids, Iowa

CHATTANOOGA CHAPTER

Chairman—Lowell H. Greene, Vance Iron & Steel Co., 19th and Grove Sts., Chattanooga 4, Tenn.
Vice-Chairman—Carl R. Thigpen, Jr., Southern Electrical Corp., Manufacturers Rd., P. O. Box 989, Chattanooga, Tenn.
Secretary-Treasurer—T. J. Cawthorn, 4615 Brainard Rd., Chattanooga, Tenn.

CHICAGO CHAPTER

Chairman—E. L. Roff, United States Steel Co., 3426 East 89th St., Chicago 17, Ill.
Vice-Chairman—Otto Zmeskal, Illinois Institute of Technology, 3300 Federal St., Chicago 16, Ill.
Secretary-Treasurer — Paul K. Zimmerman, c/o Jos. T. Ryerson & Son, Inc., P. O. Box 8000-A, Chicago 80, Ill.
Ass't. Secretary—Thomas S. Simms, P. O. Box 421, Bensenville, Ill.

CINCINNATI CHAPTER

Chairman—William Henry, 40 Euclid, Cincinnati 15, Ohio
Vice-Chairman—William D. Whalen, 6760 Placid Place, Cincinnati 36, Ohio
Secretary—G. Wesley Fischer, 3283 Montana Ave., Cincinnati 11, Ohio
Treasurer—Albert J. Pfetzing, 140 Kinsey Ave., Cincinnati 19, Ohio

CLEVELAND CHAPTER

Chairman — George D. Dolch, Jr., Thompson Products Inc., 23555 Euclid Ave., Euclid 17, Ohio
Vice-Chairman—John M. Kiefer, Jr., 4839 Brainard Rd., Bedford, Ohio
Secretary—Charles H. Junge, 2436 Eaton Rd., Cleveland 18, Ohio
Corresponding Secretary — Mary W. Paton, American Steel & Wire Div., Cuyahoga Works, 4300 East 49th St., Cleveland 5, Ohio
Treasurer — Allen M. Montgomery, 5923 Brookside Rd., Cleveland 9, Ohio

COLUMBIA BASIN CHAPTER

Chairman—O. J. Wick, 520 Sanford Ave., Richland, Wash.
Vice-Chairman—Blair R. Elder, 906 Davenport, Richland, Wash.
Secretary—Robert S. Dalrymple, 605 Birch, Richland, Wash.
Treasurer — Louis D. Turner, 303 Comstock St., Richland, Wash.

COLUMBUS CHAPTER

Chairman—E. J. Bleakley, Jeffrey Manufacturing Co., Columbus, Ohio
Vice-Chairman—Arthur B. Westerman, Battelle Memorial Institute, 505 King Ave., Columbus 1, Ohio
Secretary—R. E. Christin, Columbus Bolt & Forging Co., 291 N. Marconi Blvd., Columbus 16, Ohio
Treasurer—Franklin H. Beck, Ohio State University 207 Eng. Expt. Station, Columbus 10, Ohio

DAYTON CHAPTER

Chairman—Richard L. Moncrief, 120 Volusia Ave., Dayton 9, Ohio
Vice-Chairman—Jacob G. Gantner, 125 Virginia Ave., Davton 10, Ohio
Secretary—Chester L. Gillum, Dayton Power & Light Co., Dayton 1, Ohio
Treasurer — Leland F. House, 3212 Bexley Drive, Middletown, Ohio

DES MOINES CHAPTER

Chairman—Floyd J. Borgstedt, 917—31st St., Des Moines 12, Iowa
Vice-Chairman—Robert L. Adams, Ankeny, Iowa
Secretary-Treasurer—Dale D. Grosvenor, 312 Ash Ave., Ames, Iowa

DETROIT CHAPTER

Chairman—Robert F. Thomson, Research Laboratories Div., General Motors Corp., P. O. Box 188, North End Station, Detroit 2, Mich.
Vice-Chairman — Howard N. Bosworth, Bosworth Steel Treating Co., 18174 West Chicago, Detroit, Mich.
Secretary-Treasurer—Theodore E. Olson, 16211 Locherbie, Birmingham, Mich.
Ass't. Secretary—Margaret C. Sawyer, 849 Book Bldg., Detroit 26, Mich.

EASTERN NEW YORK CHAPTER

Chairman—Warren F. Savage, Department of Metallurgical Engineering, Rensselaer Polytechnic Institute, Troy, N. Y.
Vice-Chairman — John C. Davidson, 27 East St., Schenectady 9, N. Y.
Secretary—Paul D. Gorsuch, Works Laboratory, Bldg., #6, General Electric Co., Schenectady, N. Y.
Treasurer — Constance B. Craver, Dunn Garden Apts., Bldg. B-C, 281 Hoosick St., Troy, N. Y.

FORT WAYNE CHAPTER

Chairman—Dean W. Thompson, 126 East Fleming, Fort Wayne, Ind.
Vice-Chairman — Paul A. Lauletta, Joslyn Manufacturing & Supply Co., 1701 McKinley Ave., Fort Wayne 6, Ind.
Secretary — Donald F. Davis, 4601 Euclid Ave., Fort Wayne, Ind.
Treasurer—Fred K. Jaessing, 5710 Alexander Drive, S. E., Fort Wayne, Ind.

GEORGIA CHAPTER

Chairman—Richard L. Priess, W. R. C. Smith Publishing Co., 806 Peachtree St., N. E., Atlanta 5, Ga.
Vice-Chairman — Robert J. Raudebaugh, 228 South Colonial Homes Circle, N. W., Atlanta, Ga.
Secretary—Michael F. Wiedl, Jr., 2217 Virginia Place, N. E., Atlanta 5, Ga.
Treasurer—Ben G. Harper, Sr., 126 Greenwood Place, Decatur, Ga.

GOLDEN GATE CHAPTER

Chairman—Robert A. Johnston, 14841 Wake Ave., San Leandro, Calif.
Vice-Chairman—R. B. Freeman, Columbia-Geneva Steel Div., U. S. Steel Co., Russ Bldg., San Francisco 6, Calif.
Secretary—H. E. Krayenbuhl, Oliver United Filters, 2900 Glascock St., Oakland, Calif.
Treasurer—Frank B. Drake, Johnson Gear & Manufacturing Co., Ltd., 8th & Parker Sts., Berkeley, Calif.

HARTFORD CHAPTER

Chairman—Harold F. Sprague, New Departure Div., General Motors Corp., Bristol, Conn.
Vice-Chairman—William Mounce, 75 Pearl St., Hartford 3, Conn.
Secretary - Treasurer — Walter E. Borin, 24 Hendee Rd., Manchester, Conn.

INDIANAPOLIS CHAPTER

Chairman—Carl O. Sundberg, 2814 Eugene St., Indianapolis 44, Ind.
Vice-Chairman—J. D. Duncan, 4834 East 10th St., Indianapolis, Ind.
Secretary—Wynand W. Brandel, 610 East 66th St., Indianapolis 5, Ind.
Treasurer—W. E. Ellsworth, Room 211, 31 East Georgia, Indianapolis 4, Ind.

INLAND EMPIRE CHAPTER

Chairman—Servet A. Duran, P. O. Box 653, College Station, Pullman, Wash.
Vice-Chairman—G. S. Fergin, Kaiser Aluminum & Chemical Corp., Hillyard Station, P. O. Box 6217, Spokane 28, Wash.
Secretary-Treasurer — Francis M. Krill, Kaiser Aluminum & Chemical Corp., Trentwood Works, Spokane 6, Wash.

KANSAS CITY CHAPTER

Chairman—James G. Cametti, 6942 Floyd Ave., Overland Park, Kan.
Vice-Chairman—H. D. Beeson, Aluminum Co. of America, 2300 Power & Light Bldg., Kansas City 6, Mo.
Secretary-Treasurer—C. Gerald Hummon, 532 Crescent, Kansas City 3, Mo.

LEHIGH VALLEY CHAPTER

Chairman—W. N. Rice, 1910 Fairview Ave., Easton, Pa.
Vice-Chairman — Warren S. Eberly, Metallurgical Dept., Carpenter Steel Co., 626 Euclid Ave., Temple, Pa.
Secretary-Treasurer — Herbert F. Krohn, 1819 Millard St., Bethlehem, Pa.

LOS ALAMOS CHAPTER

Chairman—F. H. Ellinger, P. O. Box 1663, Los Alamos, N. M.
Vice-Chairman—Donald E. Grimm, 2853-A Walnut St., Los Alamos, N. M.
Secretary-Treasurer — Eugene M. Cramer, Route 1, Box 7A, Espanola, N. M.
Ass't. Secretary-Treasurer — Robert T. Phelps, 776—47th St., Los Alamos, N. M.

LOS ANGELES CHAPTER

Chairman—F. L. Stamm, 6339 North Deerfield, San Gabriel, Calif.
Vice-Chairman—J. A. Chalk, Bethlehem Pacific Coast Steel Corp., P. O. Box 2057, Terminal Annex, Los Angeles 54, Calif.
Secretary—S. R. Kallenbaugh, 221 West Venice Blvd., Los Angeles 15, Calif.
Treasurer — James R. Cady, 3760 Crestway Place, Los Angeles 43, Calif.

LOUISVILLE CHAPTER

Chairman—Milton P. Niemeier, 1720 San Jose Ave., Louisville 16, Ky.
Vice-Chairman — Harold J. Smith, 2209 Winston, Louisville 5, Ky.
Secretary-Treasurer—Carl L. Owen, Jr., 2823 Whiteway Ave., Louisville, Ky.

LOUISVILLE-UNIVERSITY OF KENTUCKY CHAPTER

Chairman—Donald B. Fairchild, R. #2, Bellefonte, Ashland, Ky.
Vice-Chairman—Dale Williams, Box 4089, University of Kentucky, Lexington, Ky.
Secretary-Treasurer—James R. Holland, 230 South Lime, Lexington, Ky.
Faculty Advisor—Joseph P. Hammond, Assistant Professor of Metallurgical Engineering, University of Kentucky, Lexington, Ky.

MAHONING VALLEY CHAPTER

Chairman—Robert P. Hill, 1750 South Heights, Youngstown 8, Ohio
Vice Chairman—E. J. P. Fisher, P. O. Box 56, North Jackson, Ohio
Secretary-Treasurer — Eugene Woloshyn, 2047 Wingate Rd., Youngstown 12, Ohio

MANITOBA CHAPTER

Chairman—G. Mason, Motor Coach Industries, Ltd., Erin St. & St. Matthews Ave., Winnipeg, Man.
Vice-Chairman—J. P. Oswald, Winnipeg Brass Ltd., 600 Clifton St., Winnipeg, Man.
Secretary-Treasurer — John Tapley, 1145 Mulvey Ave., Winnipeg, Man.

MICHIGAN COLLEGE OF MINING AND TECHNOLOGY CHAPTER

Chairman — Frederich C. Hallgren, 9910 Schaefer, Detroit 27, Mich.
Vice-Chairman—John H. Hamilton, 41930 Utica Rd., Utica, Mich.
Secretary-Treasurer—Douglas Glover, 1405 College Ave., Houghton, Mich.

MILWAUKEE CHAPTER

Chairman — John M. Beyerstedt, Nordberg Manufacturing Co., 3073 South Chase Ave., Milwaukee 7, Wis.
Vice-Chairman — Elmer Gammeter, 823 East Sylvan Ave., Milwaukee 11, Wis.
Secretary - Treasurer — Ernest G. Guenther, 526 East Ogden Ave., Milwaukee 2, Wis.

MINNESOTA CHAPTER

Chairman — George Mooney, Auto Engine Works, Inc., St. Paul, Minn.
Vice-Chairman—W. B. F. MacKay, School of Mines and Metallurgy, University of Minnesota, Minneapolis 14, Minn.
Secretary-Treasurer—Lillian K. Polzin, Hennepin Ave. at Groveland Terr., Minneapolis 5, Minn.

MISSOURI SCHOOL OF MINES CHAPTER

Chairman — Marvin L. Hugen, 672 Salem Ave., Rolla, Mo.
Vice-Chairman—Robert L. Crosby, 1733 South Douglas, Springfield, Ill.
Secretary—Jack H. Humphrey, 1107 State St., Rolla, Mo.
Treasurer—Reinhard Abendroth, 206 West 9th St., Rolla, Mo.

MONTREAL CHAPTER

Chairman — William B. Billingsley, Canadian Industries, Ltd., P. O. Box 10, Montreal, Que.

Vice-Chairman—Alfred H. Lewis, 5145 Cote St., Apt. 31, N.D.G., Montreal, Que.
Secretary—H. Neville Mason, P. O. Box 371, Station "H", Montreal, Que.
Treasurer—Arnold H. Boehm, The Steel Co. of Canada, Ltd., P. O. Box 460, Montreal, Que.

MUNCIE CHAPTER

Chairman—Walter Grunden, Jr., 320 South 11th St., New Castle, Ind.
Vice-Chairman—H. O. Bennett, 1326 Dewey, Anderson, Ind.
Secretary-Treasurer — Charles W. Hoover, 1312 Lincoln Ave., New Castle, Ind.

NEW HAVEN CHAPTER

Chairman — C. B. Christensen, 550 Iranistan Ave., Bridgeport 5, Conn.
Vice-Chairman — Ralph P. Nevers, 30 White St., Waterbury, Conn.
Secretary — Roy C. Raymond, 201 Castle Drive, Stratford, Conn.
Treasurer—Earle W. Lovering, Seymour Manufacturing Co., Seymour, Conn.

NEW JERSEY CHAPTER

Chairman—William C. Schulte, 30 Bowers Rd., Caldwell, N. J.
Vice-Chairman—W. Hughes White, 88 Hillside Ave., Verona, N. J.
Secretary—Henry F. J. Skarbek, 2038 Pleasant Parkway, Union, N. J.
Treasurer—R. W. Thorne, Bennett Steel Treating Co., 246 Raymond Blvd., Newark 5, N. J.

NEW YORK CHAPTER

Chairman—J. J. Preisler, 193 Poselle St., Mineola, N. Y.
Vice-Chairman — Neal M. Russell, Vanadium Alloys Steel Co., 270 Madison Ave., New York 16, N. Y.
Secretary—George F. Geiger, International Nickel Co., 67 Wall St., New York 5, N. Y.
Treasurer—Charles E. Hanson, Room 1202, 60 East 42nd St., New York 17, N. Y.

NORTHERN ONTARIO CHAPTER

Chairman—Gordon E. Willey, Algoma Steel Corp., Sault Ste. Marie, Ont.
Vice-Chairman—A. R. Fraser, 226 McGregor Ave., Sault Ste. Marie, Ont.
Treasurer—R. H. Baber, 961 Wellington St., East, Sault Ste. Marie, Ont.
Secretary—W. F. Buller, P.O. Box 457, Sault Ste. Marie, Ont.

NORTH TEXAS CHAPTER

Chairman—Fred E. Stanley, 832 Edgefield Rd., Ft. Worth 7, Tex.
Vice-Chairman—Kenneth Delaplaine, 5842 Velasco, Dallas 6, Tex.
Secretary—John M. Turbitt, Metal Goods Corp., 3821 Carolyn Rd., Fort Worth 4, Tex.
Treasurer—M. B. Dominy, 1607 Savoy, Dallas 8, Tex.

NORTHWESTERN PENNSYLVANIA CHAPTER

Chairman—Walter C. Struchen, 1138 Brown Ave., Erie 5, Pa.
Vice-Chairman—W. Clinton Johnson, P. O. Box 12, Irvine, Pa.
Secretary-Treasurer — Willard Roth, 283 Jefferson St., Meadville, Pa.

NOTRE DAME CHAPTER

Chairman—John E. DeMoss, University of Notre Dame, Dept. of Metallurgy, Box 145, Notre Dame, Ind.
Vice-Chairman—Max I. Beard, 708 South Lombardy Drive, South Bend 19, Ind.
Secretary-Treasurer—Ettore A. Peretti, University of Notre Dame, Notre Dame, Ind.

OAK RIDGE CHAPTER

Chairman—William T. Carey, 103 Pacific Ave., Oak Ridge, Tenn.
Vice-Chairman—William D. Manley, Metallurgy Div., Oak Ridge National Laboratory, Oak Ridge, Tenn.
Secretary—Robert H. Kernohan, 223 East Vanderbilt Drive, Oak Ridge, Tenn.
Treasurer—Gene S. Storer, Route 2, Kingston, Tenn.

ONTARIO CHAPTER

Chairman—J. S. Edgar, Thompson Products, Ltd., Louth St., St. Catharine, Ont.
Vice-Chairman—Benton Dixon, 112 Brentwood Rd., Toronto, Ont.
Secretary—A. L. MacKay, 20 Lumley Ave., Toronto, Ont.
Treasurer—Thomas A. Moses, Wallace Barnest Co. Ltd., Engineering Dept., 274 Sherman Ave., North, Hamilton, Ont.

OREGON CHAPTER

Chairman—W. R. Prier, 1127 South East 10th Ave., Portland 14, Ore.
Vice-Chairman—Fred Thiess, Route 1, Box 139, Sandy, Ore.
Secretary-Treasurer — A. H. Roberson, U. S. Bureau of Mines, Albany, Ore.

OTTAWA VALLEY CHAPTER

Chairman—Henry H. Bleakney, Bureau of Mines, 568 Booth St., Ottawa, Ont.
Vice-Chairman — A. R. Deir, 668 Cooper St., Ottawa, Ont.
Secretary-Treasurer—N. B. Brown, 31 Orrin Ave., Ottawa, Ont.

PENN STATE CHAPTER

Chairman—J. H. Wernick, Division of Metallurgy, Penn State College, State College, Pa.
Vice-Chairman — John D. Harrison, 330 East College Ave., State College, Pa.
Secretary-Treasurer — Robert W. Lindsay, Dept. of Metallurgy, Pennsylvania State College, State College, Pa.
Ass't. Secretary — Walter Showak, Hamilton Hall, Box 456, State College, Pa.

PEORIA CHAPTER

Chairman—Walter E. Short, Bradley University, Library, Bradley Hall, Peoria 5, Ill.
Vice-Chairman — William E. Frank, 209 Greenway Place, Peoria 4, Ill.
Secretary-Treasurer—R. L. Getz, Engineering Dept., Caterpiller Tractor Co., Peoria 8, Ill.

PHILADELPHIA CHAPTER

Chairman—Ardrey M. Bounds, 7112 McCallum St., Philadelphia 19, Pa.
Vice-Chairman—David M. Schmid, 630 Aronimink Place, Drexel Hill, Pa.
Secretary — Harry N. Ghenn, 630 South Orange St., Media, Pa.
Treasurer—George J. Kaiser, Pennsylvania Forge Corp., Milnor & Bleigh Sts., Tacony, Philadelphia, Pa.

PHOENIX CHAPTER

Chairman — William B. Arness, 21 West Cypress St., Phoenix, Ariz.
Vice-Chairman—Donald A. Rich, 612 North 5th Ave., Phoenix, Ariz.
Secretary-Treasurer—John R. Decker, Box 1468, Goodyear, Ariz.

PITTSBURGH CHAPTER

Chairman—G. M. Snyder, 3 Bayard Rd., Apt. #45, Pittsburgh 13, Pa.
Vice-Chairman—George H. Enzian, R. D. #11, Box 126, Dorseyville Rd., Pittsburgh 15, Pa.
Secretary—W. H. Neu, 215 Martin Bldg., 119 Federal St., Pittsburgh 12, Pa.
Treasurer—Malcolm F. Hawkes, Carnegie Institute of Technology, Pittsburgh, Pa.

PUGET SOUND CHAPTER

Chairman—Blake D. Mills, Jr., 7044—50th Ave., N.E., Seattle 5, Wash.
Vice-Chairman — Monte E. Parker, 4604—43rd Ave., South, Seattle, Wash.
Secretary - Treasurer — Clinton R. Lundy, 4220 Marine View Dr., Seattle 66, Wash.

PURDUE CHAPTER

Chairman—Carl R. Anderson, 26 North 30th St., Lafayette, Ind.
Vice-Chairman—Thomas J. Hughel, 426 South Grant St., West Lafayette, Ind.
Secretary-Treasurer — Clarence T. Leaman, 2030 Monon Ave., Lafayette, Ind.
Ass't. Secretary-Treasurer — Lester E. Alban, 417 South 29th St., Layayette, Ind.

RHODE ISLAND CHAPTER

Chairman—Arthur S. Johnson, 227 Washington St., Lakewood, R. I.
Vice-Chairman—Kenneth H. Mairs, Rhode Island State College, Kingston, R. I.
Secretary-Treasurer—James J. Desonie, 742 Broad St., Providence 7, R. I.

ROCHESTER CHAPTER

Chairman—Robert J. Barr, Rochester Steel Treating Works, 962 Main St., East, Rochester 5, N. Y.
Vice-Chairman — Robert S. Guinan, 474 Maplewood Ave., Rochester 13, N. Y.
Secretary-Treasurer—N. J. Finsterwalder, Taylor Instrument Co., 95 Ames St., Rochester, N. Y.
Ass't. Secretary—Frank W. Breslin, 111 Humboldt St., Rochester 9, N. Y.

ROCKFORD CHAPTER

Chairman—Gerald Nevins, 2120 Andrews St., Rockford, Ill.
Vice-Chairman—J. W. Eaton, 1321—3rd Ave., Rockford, Ill.
Secretary-Treasurer—H. E. Habecker, 545 Blackhawk Park Ave., Rockford, Ill.

ROCKY MOUNTAIN CHAPTER

Chairman—William J. Holtman, 475 Garfield St., Denver, Colo.
Vice-Chairman—R. L. Stark, 2220 Brentwood St., Lakewood, Colo.
Secretary—Clyde O. Penney, 2940 South Elm, Denver 5, Colo.
Treasurer — S. Mark Davidson, Thompson Pipe & Steel Co., P. O. Box 2852, Denver 1, Colo.

ROCKY MOUNTAIN CHAPTER PUEBLO GROUP

Chairman—C. C. Crawford, 406 Kenwood Dr., Pueblo, Colo.
Vice-Chairman—David R. Appel, 410 Harrison St., Pueblo, Colo.
Secretary-Treasurer — Walter W. Munn, 2111 Elizabeth St., Pueblo, Colo.

ROME CHAPTER

Chairman—William M. Hinton, 512½ William St., Rome, N. Y.
Vice-Chairman—Carl G. Moser, Utica Steam Engine & Boiler Works, 726-806 Whitesboro St., Utica 4, N. Y.
Secretary-Treasurer—John F. Pietras, Revere Copper & Brass, Inc., Rome Div., Rome, New York

ST. LOUIS CHAPTER

Chairman—B. F. Rassieur, Paulo Products Co., 5711 West Park, St. Louis 10, Mo.
Vice-Chairman—Martin E. Huether, Revere Copper & Brass, Inc., 3908 Olive St., St. Louis 8, Mo.
Secretary - Treasurer — William C. Hunter, 3870 Cleveland, St. Louis 10, Mo.

SAGINAW VALLEY CHAPTER

Chairman—F. L. Mackin, General Motors Institute of Technology, 3rd & Chevrolet Aves., Flint 2, Mich.
Vice-Chairman—Robert S. Haverberg, 319 Rosemore Dr., Davison, Mich.
Secretary-Treasurer — A. A. Moore, 1727 South Sasse Rd., Route #4, Midland, Mich.

SAN DIEGO CHAPTER

Chairman—Joseph C. Thompson, 4273 Menlo Ave., Apt. 3, San Diego 5, Calif.
Vice-Chairman—John W. Welty, 3310 South Barcelona St., Spring Valley, Calif.
Secretary—Claude E. Boyd, 1229 Wilbur, San Diego 9, Calif.
Treasurer—Sayre S. Williams, 4536 Orchard Ave., San Diego 7, Calif.

SOUTHERN TIER CHAPTER

Chairman—Samuel C. Smith, 264 Caldwell Ave., Elmira, N. Y.
Secretary-Treasurer—John B. Given, Engineering Laboratory, I. B. M. Corp., Endicott, N. Y.

SPRINGFIELD CHAPTER

Chairman—Carl A. Keyser, Massachusetts State College, Amherst, Mass.
Vice-Chairman—Charles J. Duggan, 200 Chestnut St., East Longmeadow, Mass.
Secretary-Treasurer — Ridgway A. Cook, Vanadium Alloys Steel Co., 240 Plainfield St., Springfield 7, Mass.
Ass't. Secretary-Treasurer — Leland B. Howard, 36 Druids Lane, West Springfield, Mass.

SYRACUSE CHAPTER

Chairman—Irving A. Psyck, 115 Terry Rd., Syracuse 9, N. Y.
Vice-Chairman—Melvin D. Coughenour, Carpenter Steel Co., R.F.D. #1, Jamesville, N. Y.
Secretary — Walter L. Hodapp, 5 Kelly Ave., Marcellus, N. Y.
Treasurer—Robert John Colvin, 1418 Westmoreland Ave., Syracuse 10, N. Y.

TERRA HAUTE CHAPTER

Chairman—Dennis A. Byerly, 2505 North 12th St., Terre Haute, Ind.
Vice-Chairman—Arthur H. Luehring, 2215 South 8th St., Terre Haute, Ind.
Secretary—M. E. Hansell, Rose Polytechnic Institute, Terre Haute, Ind.
Treasurer—Burlin R. McMasters, 1522 South 18th St., Terre Haute, Ind.

TEXAS CHAPTER

Chairman—M. W. Phair, Tennessee Coal Iron & R.R. Co., P. O. Box 159, Houston 1, Tex.
Vice-Chairman—W. Mack Crook, 4101 San Jacinto, Houston 4, Tex.
Secretary-Treasurer—Arthur R. Oakley, Jr., 4219 Drake, Houston 5, Tex.

TOLEDO CHAPTER

Chairman—Franklin D. Widner, 5158 Bilby Way, Sylvania, Ohio
Vice-Chairman—R. W. Furman, Jr., 2271 Castlewood Dr., Toledo 12, Ohio
Secretary-Treasurer—Ernest C. Kron, Doehler-Jarvis Corp., Toledo 1, Ohio

TRI-CITY CHAPTER

Chairman—Wendell K. Hunt, 2701 13th St. Court, Moline, Ill.
Vice-Chairman—C. Hibbard Savery, French & Hecht Div., Kelsey-Hayes Wheel Co., Davenport, Iowa
Secretary-Treasurer — Theodore F. Taylor, Iowa-Illinois Gas & Electric Co.,205 Perry St., Davenport, Iowa.

TULSA CHAPTER

Chairman—J. C. Holmberg, 418B West Haskell Place, Tulsa, Okla.
Vice-Chairman—Theodore N. Duncan, Tulsa Winch, Div. of Vickers, Inc., Tulsa, Okla.
Secretary-Treasurer — Guy V. Bennett, 1401 North Winston Ave., Tulsa, Okla.

UTAH CHAPTER

Chairman — Robert J. Prout, 560 North 1 East, American Fork, Utah
Vice-Chairman—Orson H. Davenport, Linde Air Products Co., 362 Pierpont Ave., Salt Lake City, Utah
Secretary-Treasurer—H. E. Flanders, University of Utah, Metallurgical Dept., Salt Lake City, Utah

VIRGINIA POLYTECHNIC INSTITUTE CHAPTER

Chairman — Terry S. Ullman, Box 5958, Virginia Technical Station, Blacksburg, Va.
Vice-Chairman — Alec Valdo, Box 6073, Virginia Technical Station, Blacksburg, Va.
Secretary — Edward Anderson, Box 2607, Virginia Technical Station, Blacksburg, Va.
Treasurer—Norman E. Daniel, Box 3355, Virginia Technical Station, Blacksburg, Va.

WARREN CHAPTER

Chairman — A. E. Gregg, Thomas Strip Div., Pittsburgh Steel Co., Warren, Ohio
Vice-Chairman—Clayton H. Carleton, 166 Adelaide, S.E., Warren, Ohio
Secretary-Treasurer—Leo D. Dunlap, 897 Trumbull, S.E., Warren, Ohio

WASHINGTON CHAPTER

Chairman—Eugene L. Olcott, Room 3712, Navy Dept., Washington 25, D. C.
Vice-Chairman — H. N. Arbuthnot, Allegheny Ludlum Steel Corp., 1001—15th Street, N. W., Washington 5, D. C.
Secretary-Treasurer—M. R. Meyerson, National Bureau of Standards, Northwest Bldg., Washington 25, D. C.

WESTERN ONTARIO CHAPTER

Chairman — Jess Pawley, London Concrete Machinery Ltd., London, Ont.
Vice-Chairman—I. Reid, Ford Motor Co. of Canada, London, Ont.
Secretary-Treasurer — Raymond E. Barton, Canadian Mines Equipment Ltd., 596 Hamilton Rd., London, Ont.

WEST MICHIGAN CHAPTER

Chairman—Thomas M. LaCrone, 1710 Kingston Ave., Kalamazoo, Mich.
Vice-Chairman—J. D. Fitzpatrick, Kaydon Engineering Corp., P. O. Box 688, Muskegon, Mich.
Secretary-Treasurer—John B. Powers, 1511 Roosevelt Rd., Muskegon Heights, Mich.

WICHITA CHAPTER

Chairman—Allan F. Schroeder, 2643 North Richmond, Wichita 4, Kan.
Vice-Chairman—Robert E. Layton, 144 North Clifton, Wichita, Kan.
Secretary—Eldon E. VanMeter, 155 South Chautauqua, Wichita, Kan.
Treasurer—W. E. Shelor, 517 North Madison, Wichita 6, Kan.

WORCESTER CHAPTER

Chairman—Wendell J. Johnson, 15 Knox St., Worcester 3, Mass.
Vice-Chairman—Harold J. Elmendorf, American Steel & Wire, Spring Mill, Worcester, Mass.
Secretary-Treasurer — Lincoln G. Shaw, 15 South St., Auburn, Mass.

YORK CHAPTER

Chairman—A. M. Roberts, 617 Hudson St., York, Pa.
Vice Chairman—Donald Sener, 619 South 25th St., Harrisburg, Pa.
Secretary—Roy E. Livingstone, 1717 Stanton St., York, Pa.
Treasurer—Raymond F. Vines, Dentists Supply Co., York, Pa.

IMPORTANT MEETINGS

for September

Sept. 3-13—American Society of Civil Engineers. Centennial of Engineering. Chicago. (William N. Carey, Secretary, A.S.C.E., 33 West 39th St., New York 18, N. Y.)

Sept. 5-6—Society of Naval Architects and Marine Engineers. Participation in the Centennial of Engineering. Hotel Sherman, Chicago. (W. N. Landers, Secretary, S.N.A.M.E., 29 West 39th St., New York 18, N. Y.)

Sept. 8-11—American Society of Mechanical Engineers. Fall Meeting. Hotel Sheraton, Chicago. (O. B. Schier, II, Meetings Manager, A.S.M.E. 29 West 39th St., New York 18, N. Y.)

Sept. 8-12—Instrument Society of America. Seventh National Instrument Conference and Exhibit, Cleveland, Ohio. (Richard Rimbach, I.S.A., 921 Ridge Ave., Pittsburg 12, Pa.)

Sept. 9-13—American Chemical Society. Seventh National Chemical Exposition. Chicago Coliseum. (Secretary, Chicago Section, A.C.S., 86 East Randolph St., Chicago 1, Ill.)

Sept. 10-12—National Petroleum Association. Annual Meeting. Hotel Traymore, Atlantic City, N. J. (E. H. Fallin, N.P.A., Munsey Bldg., Washington 4, D. C.)

Sept. 10-12—Porcelain Enamel Institute. Annual Shop Practice Forum. University of Illinois, Urbana, Ill. (John C. Oliver, Secretary, P. E. I., Dupont Circle Bldg., 1346 Connecticut Ave., Washington 6, D. C.

Sept. 11-13—American Institute of Chemical Engineers. Palmer House, Chicago. (S. L. Tyler, Executive Secretary, A.I.C.E., 120 East 41st St., New York 17, N. Y.)

Sept. 10-12—American Institute of Electrical Engineers. Participation in the Centennial of Engineering. (H. H. Henline, Secretary, A.I.E.E., 33 West 39th St., New York 18, N. Y.)

Sept. 14-18—Pressed Metal Institute. Annual Meeting. Pocono Manor Hotel, Pa. (E. M. Ross, P.M.I., 13210 Shaker Square, Cleveland 20, Ohio)

Sept. 14-19—American Chemical Society. National Meeting. Atlantic City, N. J. (Ivan G. Rice, Executive Secretary, A.C.S., 1155 Sixteenth St., N. W., Washington 6, D. C.)

Sept. 22-25—American Mining Congress. Metal and Nonmetallic Mineral Mining Convention and Exposition. Public Auditorium, Denver, Colo. (J. D. Conover, Secretary, A.M.C., Ring Bldg., Washington 6. D. C.)

Sept. 24-26—American Hot Dip Galvanizers Assoc., Inc. Semi-Annual Meeting. Greenbrier Hotel, White Sulphur Springs, W. Va. (Stuart J. Swenson, Secretary-Treasurer, A.H.D.G.A., 1506 First National Bank Bldg., Pittsburgh 22, Pa.)

Sept. 28-Oct. 3—American Institute of Steel Construction. Annual Convention. Empress Hotel, Victoria, B. C. (L. Abbett Post, Executive Vice-President, A.I.S.C., 101 Park Ave., New York)

Sept. 30-Oct. 3—Association of Iron and Steel Engineers. Annual Convention and Iron and Steel Exposition, Public Auditorium, Cleveland, Ohio. (T. J. Ess, Managing Director, A.I.S.E., 1010 Empire Bldg., Pittsburgh 22, Pa.)

Call Ryerson for Tested Alloy Steels

Today, when Government restrictions are enforcing the use of leaner alloys with unfamiliar heat treatment response, you'll find Ryerson Alloy Service more helpful than ever. The tests we make to assure quality, verify analysis and guide your heat treating are your best protection against production difficulties, costly breakdowns.

For example, we spark test our alloy stocks to guard against mixed steel. And we put every heat of Ryerson as rolled and annealed alloy through four separate hardenability tests. The result: positive hardenability knowledge of the particular steel shipped to you.

All test information—hardenability, analysis, etc.—is carefully recorded on a Ryerson Alloy Certificate delivered with your steel as a guide to heat treatment. So don't take today's alloys for granted. Order from Ryerson by hardenability as well as analysis—and be doubly sure.

Stocks include low, medium, and high carbon alloys in all finishes and conditions.

PRINCIPAL PRODUCTS: CARBON, ALLOY & STAINLESS STEELS . . . BARS, STRUCTURALS, PLATES, SHEETS, TUBING, ETC.

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA CINCINNATI • CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

Mellon Institute to Conduct Research Program

A Fellowship for conducting systematic studies of standardization and its applications in science, engigineering, production and marketing, has been announced by Edward R. Weidlein, president of the Mellon Institute, Pittsburgh. This Fellowship will be sustained at the Institute by a grant from the Sarah Mellon Scaife Foundation of Pittsburgh, and its projects will be organized and supervised by Dickson Reck, advisory fellow. Dr. Reck will work in cooperation with research specialists of the Institute and with national authorities and societies.

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received During the Past Month

Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio

W. W. Howell, Technical Abstracter

Assisted by Joseph Enke, Elizabeth Volpe and Members of the Translation Group

A
GENERAL METALLURGICAL

235-A. Save by Briquetting Borings. *American Foundryman,* v. 21, June 1952, p. 40-41.

Equipment and procedure of Stockham Valves & Fittings, Inc., Birmingham, Ala., for briquetting gray-iron and malleable borings and turnings for use as scrap. (A8, CI)

236-A. Atmospheric Pollution. Louis C. McCabe. *Industrial and Engineering Chemistry,* v. 44, June 1952, p. 103A-104A, 106A.

Tests indicate that two or more types of equipment may be required to control gases from gray-iron foundries since no single, inexpensive, dust-recovery principle seems adequate. (A7, E11, CI)

237-A. Treating Industrial Wastes at National Carbon. C. F. Pearson. *Industry and Power,* v. 62, June 1952, p. 78-80.

Procedures and equipment for disposal of plating and pickling wastes at National Carbon's St. Albans, Vt., plant. (A8, L12, L17)

238-A. Do Foreign Machine Tools Menace U. S. Builders' Markets? Max Leach. *Iron Age,* v. 169, June 19, 1952, p. 150-152. (A4)

239-A. Price-Volume Ratios for Plastics and Metals. *Materials & Methods,* v. 35, June 1952, p. 137.

Information presented graphically. (A4)

240-A. Tinplate Demand and Supply. *Metal Bulletin,* June 6, 1952, p. 17-20.

Based on an examination, by J. Ryan, of likely supply and demand for tinplate throughout the world during the next four years in order to estimate whether or not the current increases in tinplate manufacturing capacity will be sufficient to meet the demand. Tables. (A4, Sn, CN)

241-A. Neutralization of Waste Pickle Liquor. *Metal Progress,* v. 67, June 1952, p. 156, 160. (Condensed from "Acid Iron Wastes Neutralization", Richard D. Hoak.)

Previously abstracted from *Sewage and Industrial Wastes.* See item 77-A, 1950. (A8)

242-A. The Manganese Situation. Rowland King. *Western Miner,* v. 25, June 1952, p. 54.

Present status of the Mn ore situation in the U. S. Compares domestic and foreign production for the past decade. Statistics from the Minerals Yearbook of the U. S. Bureau of Mines. (A4, Mn)

243-A. (Italian.) Laboratory of Electrochemistry, Chemistry, Physics, and Metallurgy of the Polytechnic Institute of Milan. R. Piontelli. *Metallurgia Italiana,* v. 44, May 1952, p. 184-192.

Illustrated description of facilities of the different sections. List of publications, 1948-1952. (A9)

244-A. Foundation for Growth and Security. *Chemical and Engineering News,* v. 30, July 7, 1952, p. 2798-2800, 2873.

Reviews first volume of series of reports prepared by the President's Materials Policy Commission. Graphs show present status and future prospects of U. S. materials supply and consumption. Recommendations. (A4)

245-A. Mechanized System Launches New Era for Literature Searching. *Chemical and Engineering News,* v. 30, July 7, 1952, p. 2806, 2808, 2810.

Reviews proceedings of recent MIT meeting on mechanized literature searching and associated problems. A new IBM machine and search system. Exploratory work on coding systems, development of "machine language", a proposed ultra-high-speed electronic scanner, and the scientific literature problem which makes development of mechanized methods obligatory. (A9)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

246-A. What *Can* Happen by 1962. *Chemical Engineering,* v. 59, June 1952, p. 389-390, 392-393.

Outlook for the process industries, including metalworking, based on a detailed survey made by McGraw-Hill's Dept. of Economics. Charts. (A4)

247-A. New Combustion Catalyst Beats Air Pollution. Arthur E. Uhleen. *Factory Management and Maintenance,* v. 110, July 1952, p. 124-125.

Houdry catalyst unit consists of a brick plus 73 porcelain rods coated with catalytic alumina and platinum alloy. This coating completely oxidizes combustibles even at temperatures well below their normal burning points and generates enough waste heat to fire boilers and heat plant processes. Experiences in using the catalyst units in paint-drying ovens. (A7, L26)

248-A. Minerals: Better Get Smart or Go Broke. *Iron Age,* v. 169, June 26, 1952, p. 55-56.

Statistical report on the critical shortage of certain minerals in the U. S. Table of pertinent data includes estimated future trend of mineral consumption. (A4)

249-A. Alnico Recovery Process Salvages Valuable Nickel, Cobalt. Arant H. Sherman and Marvin Pesses. *Iron Age,* v. 170, July 3, 1952, p. 115-119.

A practical method for recovery of above waste metal grindings and skimmings in manufacture of permanent magnets. (A8, Ni, Co, Cu)

250-A. Outlook for Aluminum Industry Is Bright—Executive Predicts. David P. Reynolds. *Light Metal Age,* June 1952, p. 16, 24.

Anticipated production figures, and possible application of atomic power to Al production. (A4, Al)

251-A. The French Iron and Steel Industry. *Metal Bulletin,* June 13, 1952, p. 13-20.

Impressions of a recent visit to the Lorraine and Nord steel areas of France. (A4, D general, Fe, ST)

252-A. Government Price, Allocation Controls Seen Contributing Factors to Shortage of Copper. Whipple Jacobs. *Metals,* v. 22, June 1952, p. 7-8.

Predictions of president, Phelps Dodge Copper Products Corp. (A4, Cu)

253-A. Estimates Free World Annual Output of Nickel Will Increase 65 Per Cent Above Prewar Years. John F. Thompson. *Metals,* v. 22, June 1952, p. 9, 19.

Predictions of chairman, International Nickel Co. of Canada, Ltd. (A4, Ni)

254-A. Yugoslav Mining Expands With Metals Going to "Free World". P. J. Sergeant. *Mining World,* v. 14, July 1952, p. 32-35.

A personal tour and survey of major Yugoslavian mining areas confirms recent reports of rapid expansion and growing exports of nonferrous metals from this country. (A4, B10, EG-a)

255-A. Interview With Kaiser Aluminum's Bert Inch. *Modern Metals,* v. 8, June 1952, p. 29-30, 32.

Answers to pertinent questions concerning several specific aspects of the immediate and long-term outlook for Al. (A4, Al)

256-A. ALCOA Gears up for Big Peacetime Markets. I. W. Wilson. *Modern Metals,* v. 8, June 1952, p. 48-50, 52.

Alcoa's present and prospective position in the Al industry and what the future holds for Al. Details of Alcoa's expansion, how it is being financed, and what the major markets will be. Graphs. (A4, Al)

257-A. "Czar" Sam Anderson Discusses the Aluminum Supply Outlook. *Modern Metals,* v. 8, June 1952, p. 55-56, 58, 60-61.

Questions concerning the rise in civilian Al demand, long-term military requirements, further expansion of U. S. productive capacity,

increased imports from Canada, and the impact of all these factors on the accumulation of an Al stockpile. Results of recent government-industry meetings. Graphs. (A4, Al)

258-A. Output of Copper in 1951, by Producers. David N. Skillings. *Skillings' Mining Review,* v. 41, July 12, 1952, p. 1-2.
(A4, Cu)

259-A. (German.) **Purification of Gases by Bag Filters and Cyclone Separators.** Werner Sauermann. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, May 1952, p. 185-191.
Characteristics of bag filters, cyclone separators, and dust centrifuges. Industrial uses of specialized types. Diagrams. (A5)

260-A. Light Metals Face a Busy Future. Charles M. Craighead. *Battelle Technical Review,* v. 1, June 1952, p. 65-66.
Prospects for expanded use of Al and Mg and their alloys, as well as present and potential raw-material and power sources (the latter for reduction of Al_2O_3 to Al.) (A4, Al)

261-A. Engineering and Metallurgical Research by Babcock & Wilcox, Limited, at Renfrew. *Engineering,* v. 173, June 27, 1952, p. 797-801.
Research program of English company primarily concerned with boiler design but covering a wide variety of developments in design, measurement techniques, etc. (A9)

262-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 19, May 1952, p. 217-224, June 1952, p. 265-272.
May issue covers "Brown & Sharpe Gauge" to "Celtium". June issue covers "Cement to Coarse Metals". (To be continued.) (A10)

263-A. Research and Development in the Mineral and Metal Industries. Robert F. Mehl. *Mines Magazine,* v. 42, June 1952, p. 39-41, 46, 50.
An address. (A9)

264-A. Point IV—Medieval Mining Frontiers Pushed Back. Alan Probert. *Mining Engineering,* v. 4, July 1952, p. 661-665.
Point Four mineral projects are wholly devoted to technical assistance in cooperation with other governments and have no direct responsibility for procurement. The objective of the program is to impart American skills and techniques directly to the peoples of industrially underdeveloped countries. Discusses mineral status of and progress in Brazil, Nepal, India, Mexico, Bolivia, and Colombia. Photographs. (A4, B10)

265-A. The General Organization of Technical and Scientific Societies in Great Britain and Switzerland. *Sheet Metal Industries,* v. 29, July 1952, p. 600-606.
A report of a joint technical conference held in Zurich recently. Only the Swiss societies are dealt with. Activities of a number of these are given briefly. (A9)

266-A. Instituto Sperimentale del Metalli Leggeri: A Review of the Activities of the Institute During 1951. M. D. J. Brisby. *Sheet Metal Industries,* v. 29, July 1952, p. 607-608.
(A9)

267-A. (Book). **A Bibliographical Survey of German and Japanese Experience in the Extraction of Low-Grade Non-Ferrous Ores and the Recovery of Non-Ferrous Metals and Compounds.** 100 pages. H. M. Stationery Office, York House, Kingsway, London W.C.2, England. (Dept. of Scientific and Industrial Research, Technical Information and Documentation Unit, Report RMS-3.) 90c.
Based on German and Japanese experience before and during the war. Mining and ore dressing, smelting and recovery of base metals. Production and recovery of nonferrous metals. The waste materials from which metals have been recovered include slags, scrap metals, waste liquors, flue dusts, and spent catalysts. Grinding dust, swarf, and even floor sweepings from engineering works can be treated for recovery of scarce metals.
(A8, B general, EG-a)

268-A. (Book) **Elementary Metallurgy. Ed. 2.** Lee H. Johnson. 258 pages. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. $4.50.
Popular text designed to give the reader a better understanding of the metals with which he is specifically concerned. Stress has been placed on the origin of steel and the influence of carbon. Detail is included on the openhearth process and the blast-furnace process and the chapter on wrought iron contains a description of the Aston process. Recent metallurgical developments are included.
(A general, D general, Fe, ST)

269-A. (Book) **Handbook of Engineering Fundamentals. Ed. 2.** Ovid W. Eshbach, editor. 914 pages. 1952. John Wiley & Sons, 601 W. 25th St., New York 18, N. Y. $10.00.
Mathematical and physical tables; mathematics; physical units and standards; mechanics of rigid bodies; mechanics of deformable bodies; mechanics of incompressible fluids; aerodynamics; engineering thermodynamics; electricity and magnetism; radiation, light, and acoustics; chemistry; metallic materials; nonmetallic materials; and engineering law. Replaces 1936 edition. (A general, U general)

270-A. (Book) **Red Metal; the Calumet and Hecla Story.** C. Harry Benedict. 257 pages. 1952. University of Michigan Press, Ann Arbor, Mich.
The story of the past linked to the present by the energies and fortunes of many men. Covers 85 years of American enterprise relating to the largest of the copper mines of the Michigan Upper Peninsula.
(S4, B12)

271-A. (Book) **Practical Metallurgy for Engineers. Ed. 5.** 599 pages. E. F. Houghton Co., Philadelphia.
Latest metalworking standards and practices. Probabilities for the future relating to new metals, alloying elements, and types of heat treatment. Chapters added since the 1943 edition include one on flame and induction heating. New material on other surface-hardening methods. Other revisions incorporate latest AISI steel specifications.
(A general, J general)

B

RAW MATERIALS AND ORE PREPARATION

250-B. Basic Minerals: Shortages Eased by Expanding Supplies. Charles White Merrill. *Industrial and Engineering Chemistry,* v. 44, June 1952, p. 1223-1228.
Economic analysis and statistical presentation. (B10, A4)

251-B. Basic Minerals: Foreign Sources Loom Larger in U. S. Supply. Elmer W. Pehrson. *Industrial and Engineering Chemistry,* v. 44, June 1952, p. 1232-1234.
A survey. Graphs. (B10)

252-B. Copper: Michigan Mines Stage Comeback. R. D. Raddant. *Iron Age,* v. 169, June 19, 1952, p. 94-95.
Current status of Calumet & Hecla mines and of the White Pine mine development. (B12, B10, Cu)

253-B. A Cell for High Temperature Electrochemical Studies of Molten Salts and Slags. M. T. Simnad, W. E. Dennis, and G. Derge. *Review of Scientific Instruments,* v. 23, May 1952, p. 248-249.
Cell designed to measure accurately conductivity, transference numbers, and ionic mobility of the salts and slags. Diagram. (B21)

254-B. Electrolytic Manganese Tests in Cooperation With Industry. Frederick Siliers, Jr. *U. S. Bureau of Mines,* Report of Investigations 4861, May 1952, 81 pages.
To prove that electrolytic manganese from our low-grade domestic ores could be substituted satisfactorily for ferromanganese made from high-grade foreign ores, an extensive series of tests was conducted in cooperation with industry, in which electrolytic manganese produced by the Bureau of Mines at its Boulder City, Nev., Station was substituted for the ordinary ferro grades in the production of ferrous and nonferrous metals and alloys and welding-rod coatings. For some purposes electrolytic Mn was shown to be superior to other grades because of its high purity. Results of tests made in cooperation with industry are tabulated and discussed. 31 ref. (B22, Mn, ST)

255-B. Concentration of Oxide Manganese Ores From the Vicinity of Cleveland, Bannock County, Idaho. K. C. Vincent and D. T. Holmes. *U. S. Bureau of Mines,* Report of Investigations 4884, May 1952, 14 pages.
This ore proved readily amenable to heavy-medium separation to recover approximately 45% of the total Mn as a +51%-Mn product. As the product was high in MnO_2 content and free from usual impurities, it might be acceptable as battery filler or for other special uses. Combined sink-and-float and tabling treatment recovered 51.8% of the Mn in a +48% product, marketable directly without sintering. Heavy-medium separation, supplemented by flotation of calcite from reground coarse reject and untreated undersize, recovered 70.1% of the total Mn in a combined product that, when sintered, assayed over 48% Mn. (B14, Mn)

256-B. Experimental Treatment of Barite Ores From Montgomery County, Ark., and Morgan County, Mo. D. W. Frommer and M. M. Fine. *U. S. Bureau of Mines,* Report of Investigations 4881, May 1952, 11 pages.
Laboratory mineral-dressing investigations show that above ores are potential sources of barite and zinc. Fine grinding and froth flotation yielded drilling-grade barite from the former and chemical-grade barite and Zn concentrates from the latter. (B13, B14, Zn)

257-B. (English.) **The Conductivity of Some Molten Silicates on Fayalite Basis.** G. Björling. *Kungl. Tekniska Högskolans Handlingar* (Transactions of the Royal Institute of Technology), No. 59, 1952, 29 pages.
Importance of slag conductivities to electrochemical extraction of metals and ores. Conductivity of molten fayalite with different additions was measured from 1300-1400° C. to the temperature of initiation of crystallization. Additions were dicalcium silicate; monocalcium silicate (wollastonite); dizinc silicate (willemite); dimanganese silicate (tephroite); oxides of Ca, Al, Mg and Zn; magnetite; sulfides of heavy metals; and fluorspar. A theory is developed that only mobile cations can par-

ticipate in the conduction, while the big anions lay practically immobile in the melt. 26 ref. (B21)

258-B. The Trend of Mineral Dressing in North America. *Bulletin of the Institution of Mining and Metallurgy,* June 1952; *Transactions,* v. 61, p. 9, 1951-52, p. 444-459.

Discussion of paper by M. G. Fleming. (April 1952 issue.) (B14)

259-B. Theory and Practice of Roasting Sulphide Concentrates With Special Reference to Canadian Gold Ores and Concentrates. L. E. Djingheuzian. *Canadian Mining and Metallurgical Bulletin,* v. 45, June 1952, p. 352-362; disc., p. 362-364; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, p. 238-248; disc., p. 248-250.

Reviews some Canadian papers on roasting practices. Analyzes the mechanism of roasting. (B15, Au)

260-B. Heavy-Media Separation; a Modern Mineral Dressing Process. S. A. Falconer. *Foote Prints,* v. 24, no. 1, 1952, p. 9-17. (B14)

261-B. Fuel and Metal. R. J. Sarjant. *Foundry Trade Journal,* v. 92, June 12, 1952, p. 619-628.

Broad treatment of ferrous production and melting operations, stressing fuel and fuel requirements. Coke in metal melting; coke shortages; contrast between cupola and blast-furnace requirements; constitution of coal; correlation of carbonizing conditions and coke properties; impact testing of coke; cupola flow and reactions; coke reactivity; the hot-blast cupola; and oxygen enrichment. 33 ref. (B18, D general, Fe, CI, ST)

262-B. Distribution of Manganese and Oxygen Between Molten Iron and FeO-MnO-SiO_2 Slags. H. B. Bell, A. B. Murad, and P. T. Carter. *Journal of Metals,* v. 4, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 718-722.

The above distribution was determined and used to calculate activities of MnO and SiO_2 in MnO-SiO_2 slags. Graphs and diagrams. 14 ref. (B21, D general)

263-B. Thermodynamics of Iron-Silicate Slags: Slags Saturated With Solid Silica. E. J. Michal and R. Schuhmann, Jr. *Journal of Metals,* v. 4, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 723-728.

Experimental measurements are reported for the O_2 pressures of iron silicate slags in equilibrium with solid silica. Such slags have practical importance in copper smelting, in acid steelmaking, and in accounting for the service behavior of silica refractories. From the data, activity vs. composition relationships are calculated for O_2, FeO, and Fe. Tables and graphs. (B21, P12, Cu, ST)

264-B. Rhude Wet Grinds Ferrosilicon for the Iron Range HMS Plants. *Mining World,* v. 14, July 1952, p. 41-43.

Rhude Media Co., Marble, Minn. wet grinds ferrosilicon and delivers it as filter cake to heavy-media separation plants on the Iron Ranges. (B13, Fe)

265-B. Hanna Iron Ore Co. Uses Heated Screens to Successfully Dry-Screen Wet Sticky Ores. Stephen E. Erickson and Masao Tanamachi. *Mining World,* v. 14, July 1952, p. 47, 49.

Equipment and procedures. (B13, Fe)

266-B. Iron Ore Conditioning and Sintering. *Skillings' Mining Review,* v. 41, July 5, 1952, p. 1, 4.

Various iron ores for blast-furnace use, each of fairly uniform composition, are crushed, screened, and blended to a uniform excess acidity in the Central Ore Conditioning and Sintering Plant of Tennessee Coal & Iron Div., U. S. Steel Co., near Birmingham, Ala. Equipment and procedures. (B13, B16, Fe)

267-B. (German.) Flotation of Lead-Zinc Ores With High Kaolin Content. Werner Gründer and Bela Bunji. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, May 1952, p. 182-185.

Laboratory experiments on the above. Application of results of these experiments to the flotation process. Results of large-scale experiments, justifying certain changes in procedure. Diagrams. (B14, Pb, Zn)

268-B. (Russian.) Electrocapillary Phenomena at High Temperatures. O. A. Esin, Iu. P. Nikitin, and S. I. Popel. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Mar. 21, 1952, p. 431-434.

Experiments were made on metal-slag systems, involving a complex Al-Ca-Na silicate and Fe-C alloys containing 2.5, 3.0, and 4.0% C. Equipment and charted data. (B21, ST)

269-B. Work on Taconite Now Heads Toward Commercial Goal. A. H. Hubbell. *Engineering and Mining Journal,* v. 153, July 1952, p. 72-75.

Indicates that 1952 should see two more preliminary or experimental plants in operation with construction of two "ultimate" plants begun. Annual production should be at least 10,000,000 tons in 1960. (B16, A4, Fe)

270-B. How the Hollinger Mill Solves the Dust Control Problem. P. J. Dunlop. *Engineering and Mining Journal,* v. 153, July 1952, p. 79-82.

Dust-control flowsheet superimposed on crushing-plant flowsheet, at Hollinger Consolidated Gold Mines, Ltd., Timmins, Ont., Canada. (B13, A5, Au)

271-B. Separation of Thorium From Monazite. S. R. Sivarajan. *Journal of the Indian Institute of Science,* v. 34, sec. A, Jan. 1952, p. 1-3.

Pure Travancore monazite freed from zircon, rutile, and siliceous impurities was used in the investigations. Results are charted. (B14, Th)

272-B. Beneficiation of Low-Grade Chrome Ore From Dodkanya (Mysore). P. I. A. Narayanan and G. P. Mathur. *Journal of Scientific & Industrial Research,* v. 11A, May 1952, p. 202-204.

Gravity methods of concentration were employed using the jig, Wilfley table, and Humphrey's spiral. Data tabulated. (B14, Cr)

273-B. Beneficiation of Low-Grade Soft Chrome Ore From Kittaburu, Singhbhum District, Bihar. P. I. A. Narayanan and S. K. Banerjee. *Journal of Scientific & Industrial Research,* v. 11A, May 1952, p. 205-206.

Jigging, tabling, and Humphrey's spiral tests were employed. Data tabulated. (B14, Cr)

274-B. Beneficiation of Low-Grade Hard Chrome Ore From Kittaburu, Singhbhum District, Bihar. P. I. A. Narayanan and M. C. Sen. *Journal of Scientific & Industrial Research,* v. 11A, May 1952, p. 207-209.

Jigging, tabling, Humphrey's spiral, and flotation tests were employed. (B14, Cr)

275-B. Mining and Milling at Amalgamated Banket Areas. E. J. Perry. *Mine & Quarry Engineering,* v. 18, July 1952, p. 218-222.

Operations at gold-producing company in the Gold Coast Colony. Crushing, ball milling, and cyanide treatment. Flowsheet. (B12, B13, B14, Au)

276-B. Newfoundland Explores Its Mineral Wealth. George G. Thomas. *Mining Engineering,* v. 4, July 1952, p. 672-673.

Fast-growing interest in the mineral wealth and mineral mining of Newfoundland. (B10)

277-B. Liberia—the Bomi Hills Development. *Mining Engineering,* v. 4, July 1952, p. 674-675.

Brief discussion of the high-quality iron ore of the Bomi Hills of Liberia. (B10, Fe)

278-B. Adsorption of Sodium Ion on Quartz. A. M. Gaudin, H. R. Spedden, and P. A. Laxen. *Mining Engineering,* v. 4, July 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 693-696.

Results of experiments in the development of flotation theory. Tables and graphs. 18 ref. (B14)

279-B. The Effect of Certain Starches on Quartz and Hematite Suspensions. Strathmore R. B. Cooke, Norman F. Schulz, and Emert W. Lindroos. *Mining Engineering,* v. 4, July 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 697-698.

Test materials, starch adsorption on mineral surfaces, flocculation, and flotation. (B14)

280-B. Experimental Furnace Recovers Manganese From Slag. R. C. Buehl. *Steel Equipment & News,* v. 5, June 1952, p. 24-25.

Previously abstracted from *Iron Age.* See item 107-B, 1952. (B21, A8, Mn, Fe-n)

281-B. (Book) Symposium on Bulk Sampling. 65 pages. 1952. American Society for Testing Materials. 1916 Race St., Philadelphia 3, Pa. (Special Technical Publication 114.)

Introduction, by W. Edwards Deming, plus six papers on specific aspects. Includes two on coal sampling and a joint discussion on this topic. (B11)

C

NONFERROUS EXTRACTION AND REFINING

104-C. Why Doesn't Somebody Make a Long, Thin Ingot? L. M. Long. *American Foundryman,* v. 21, June 1952, p. 53.

The average brass and bronze ingot made today does not have the most efficient area-to-mass ratio for heat transference. Describes a different shape that in actual tests has reduced melting time by an average of 14 min. per heat, with a proportionate savings in fuel and labor costs. (C5, Cu)

105-C. The Preparation of Rare Earth Metals. F. H. Spedding and A. H. Daane. *Journal of the American Chemical Society,* v. 74, June 5, 1952, p. 2783-2785.

In order to prepare highly pure rare-earth metals, a technique was devised whereby rare-earth chlorides are reduced by Ca in Ta crucibles; the resulting rare-earth metal is vacuum cast in Ta containers. Sa, Eu, and Yb chlorides are reduced only to their stable divalent state and can thus be efficiently removed from rare-earth mixtures by such processing. (C25, C26, EG-g)

106-C. New Chemical Method Recovers Nickel, Cobalt, Copper Metal. *Mining Engineering,* v. 4, June 1952, p. 565-567.

See abstract of "Chemical Ore Re-

duction Process May Pay Out in Three Years", *Chemical and Engineering News;* item 78-C, 1952.
(C general, B14, Ni, Co, Cu, Mn)

107-C. (French) **Relationship Between the Refining Process for Copper, and the Processing of Its Alloys.** Marcel Cirou. *Fonderie,* May 1952, p. 2927-2937.

Melting and refining of copper; physical and chemical reactions of refining; and processing of the principal Cu alloys. Tables, graphs, and photographs. 16 ref. (C21, Cu)

108-C. Chemical Treatment of Molten Non-Ferrous Metals. Part 2. D. A. Dodson. *Canadian Metals,* v. 15, June 1952, p. 32-34.

Fluxing procedure, degassing, and grain refining of Al alloys; and, briefly, degassing and grain refining of Mg alloys. (C21, E25, Al, Mg)

109-C. Chemical Refining of Metals. *Chemical Engineering,* v. 59, June 1952, p. 164-168, 368, 370, 372-374, 376.

See abstract of "Chemical Ore Reduction Process May Pay Out in Three Years", *Chemical and Engineering News;* item 78-C, 1952.
(C general, B14, Ni, Co, Cu, Mn)

110-C. Chlorination of Zirconium Oxide. W. W. Stephens and H. L. Gilbert. *Journal of Metals,* v. 4, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 733-737.

Production of anhydrous $ZrCl_4$ required as a starting material in the Kroll process for production of ductile Zr. It is produced by direct chlorination of a ZrO_2-C mixture in a silica-brick-lined chlorinator. Theory and thermodynamics of reactions. A pilot-model chlorinator and full-scale production equipment. Operating data. 10 ref. (C26, Zr)

111-C. The Cominco Suspension Roasting Process. K. D. McBean. *Mining Congress Journal,* v. 38, June 1952, p. 36-39, 84.

Process developed by Consolidated Mining and Smelting Co. of Canada, Ltd., Trail, B. C., for recovery and utilization of waste SO_2 gases. Operating refinements and changes in design reviewed and evaluated in light of latest requirements. Application has been largely to the Zn-roasting process, although experiments indicate applicability to roasting of other mineral sulfides, such as Pb and Cu concentrates, Cu mattes, and Sb sulfides, with the production of gases rich in SO_2 and efficient recovery of waste heat from the gases. The process has also been successfully used for calcination, or reoxidation, of iron oxide catalyst and for decomposition of $MnSO_4$ by use of supplemental fuel. (C21, A8)

112-C. Chemico Process Recovers Metals From Concentrate in a Few Hours. *Mining World,* v. 14, July 1952, p. 44-45.

See abstract of "Chemical Ore Reduction Process May Pay Out in Three Years", *Chemical and Engineering News;* item 78-C, 1952.
(C general, B14, Ni, Co, Cu, Mn)

113-C. Another Aluminum Smelter in the Gulf Coast Region. *Modern Metals,* v. 8, June 1952, p. 64-66, 68.

The Reynolds Metals Co.'s new Al reduction works at San Patricio, Tex. (C21, Al)

114-C. (German.) **Separation of Cadmium-Zinc Alloys by Vacuum Sublimation.** Walter Scheller and W. D. Treadwell. *Helvetica Chimica Acta,* v. 35, no. 3, 1952, p. 745-753.

Experiments with high-purity Zn-Cd alloys revealed an additional point on the solidus of the Cd-rich solid solution at 250° C. Dezincification of a Zn-poor Cd alloy with steam at 400° C. showed that the process proceeds rapidly until the Zn content is reduced to 0.0035%. Diagrams, tables, and graphs. 12 ref. (C25, Cd, Zn)

115-C. (German.) **New Developments in Continuous Casting.** Otto Schaaber. *Zeitschrift für Metallkunde,* v. 43, May 1952, p. 181-190.

Reviews continuous casting on the basis of the literature, particularly factors responsible for difficulties, the casting properties of steel, Cu, and Al. New-type installations for continuous casting of nonferrous metals and steel. Schematic drawings. 41 ref. (C5, D9, ST, Cu, Al)

116-C. (Russian.) **A New Method of Separating Eutectic Alloys.** S. I. Drakin. "Izvestiia Sektora Fiziko-Khimicheskogo Analiza", v. 20 (Academy of Sciences of the USSR), p. 341-344.

Crystallization of binary alloys under the influence of an electrical current is proposed as a means of separating the components. Data are charted for Sn-Bi and Cd-Bi alloys. (C28, Sn, Cd, Bi)

117-C. Sterling Furnace Smelts Zinc With Electric Arc. *Engineering and Mining Journal,* v. 153, July 1952, p. 76-78.

New Jersey Zinc Co.'s patented Sterling Process. Includes flowsheet and furnace diagrams.
(C21, Zn)

118-C. (Book) **The Principles of Extraction and Refining of Metals.** 102 pages. Institution of Metallurgists, 4 Grosvenor Gardens, London, S.W. 1. 12s. 6d.

A record of the 1950 Refresher Course. Five lectures are covered: "Physical Chemistry and its Use in Extraction Operations," A. J. E. Welch; "The Place of Mineral Dressing Extraction Metallurgy," E. J. Pryor; "Principles of Ore Reduction," C. W. Dannat; "Fundamentals of the Production of Metal and Alloy Ingots," L. Northcott; and "Principles Underlying Refining Processes," F. D. Richardson.
(C general, D general, B general)

D

FERROUS REDUCTION AND REFINING

277-D. Free-Cutting Steel: Manufacturing Developments During the Last Thirty Years. James A. Anderson. *British Steelmaker,* v. 18, June 1952, p. 302-305, 310.

Experiences from 1920 to 1940, in development of free-cutting steel. Postwar development of a process for the manufacture of free-cutting steel with a 100% scrap charge, re-using the same Mn slag over and over again, and reducing the lime feed to negligible proportions.
(D2, G17, CN, SG-k)

278-D. Sulfur in Steel: BISRA Studies New Methods of Removing Sulfur From Steel. *Iron Age,* v. 169, June 19, 1952, p. 174-175.

Brief report. (D general, ST)

279-D. High Top Pressure: Further Operating Experience With Clyde No. 2 Furnace. R. P. Towndrow and W. Banks. *Iron & Steel,* v. 25, June 1952, p. 291-296.

A comparison of performance of a high-top-pressure furnace with a normal-pressure furnace at Clyde Iron Works. Details of furnaces and several methods for evaluation of operation. Graphs and tables.
(D1, Fe)

280-D. History of the All-Basic Open Hearth Furnace. W. A. Archibald. *Iron and Steel Institute,* Special Report 46, p. 1-14; disc., p. 77-86.

Continental, prewar British, American and Canadian all-basic trials. Extensive tables list and classify relevant patents. Numerous diagrams. 105 ref. (D2, ST)

281-D. Properties of Basic Raw Materials and Bricks. G. R. Rigby. *Iron and Steel Institute,* Special Report 46, p. 15-21; disc., p. 77-86.

Reasons for the choice of a certain Turkish chrome ore for the initial chrome-magnesite roof bricks. Chemical reactions undergone by spinels and matrix minerals during firing of chrome-magnesite bricks. Ways in which properties of basic bricks might be further improved; use of other types of chrome ore; increase in amount of matrix; and variations in grading and proportion of chrome ore in the brick 11 ref. (D2, B19, ST)

282-D. The Trail All-Basic Furnaces in Great Britain and Holland. D. C. Muir. *Iron and Steel Institute,* Special Report 46, p. 22-39; disc., p. 75, 77-86.

Details of design and operation. Extensive tables, diagrams, and illustrations. (D2, ST)

283-D. Stresses in All-Basic Furnace Roofs. Calculated Roof Stresses. J. E. Pluck. **Calculated Roof Stresses in an All-Basic Furnace at Bilston, 1938.** J. McCracken and L. G. Stokes. **Measurement of Interface Brick Pressures in Basic Open-Hearth Furnace Roofs.** R. M. J. Withers. *Iron and Steel Institute,* Special Report 46, p. 40-56; disc., p. 76-87.

First article: principles of the design of all-basic furnace roofs, derived from a study of calculated roof stresses. Relation of these principles to the present-day design of all-basic roofs, including a design patented by the author which allows automatic adjustment of roof shape as the bricks expand. Second article: A type of roof structure and calculated stresses for a basic roof which gave successful performance. Third article: A method for measuring pressures between brick faces in an openhearth furnace roof arch during roof construction and under normal operating conditions. Diagrams and graphs. (D2, ST)

284-D. Operating Experience on the Trial Furnaces. J. McCracken. *Iron and Steel Institute,* Special Report 46, p. 57-61; disc., p. 77-87.

Performance of six all-basic furnaces is discussed from the point of view of the steelworks manager; improvements are suggested.
(D2, ST)

285-D. Performance of Refractories in All-Basic Open-Hearth Furnaces. J. Mackenzie. *Iron and Steel Institute.* Special Report 46, p. 62-68; disc., p. 77-87.

Detailed information based on experiments. Diagrams and illustrations. (D2, ST)

286-D. A Critical Analysis of the Results of All-Basic Open-Hearth Furnace Trials. J. H. Chesters and J. Mackenzie. *Iron and Steel Institute,* Special Report 46, p. 69-73; disc., p. 77-87.

Concludes that the determining factor in future development of all-basic furnaces is the purely economic one of whether the gains in output, longer lives, and higher availability will offset the increased cost of construction. Two years' cost data on one furnace show a fuel bill identical with that of the silica furnace and a refractories cost of the same order as that obtained for silica furnaces. (D2, ST)

287-D. New Electric Furnace Ups Atlantic's Output by 112,000 Tons. *Manufacturers Record,* v. 121, June 1952, p. 39.

Furnace is largest in southeast, recently placed in operation at Atlantic Steel Co., Atlanta. (D5, ST)

288-D. Blast Furnace Practice. (Concluded.) **Beneficiation of Air. XI(d).** Charles E. Agnew. *Steel,* v. 130, June 23, 1952, p. 82, 85-86, 89.

How furnace operating conditions can be created to permit use of oxygen-enriched air thereby increasing iron production with reduced blast and fuel. (D1, Fe)

289-D. (German.) **Effects of Blast-Furnace Operation on the Progress of Reactions in Basic-Bessemer-Steel Melts.** Willy Oelsen and Erwin Eickworth. *Stahl und Eisen,* v. 72, May 22, 1952, p. 597-605.

Effect of progress of the decarburizing reaction on take-up of nitrogen of basic bessemer steel melts. The manganese hump during decarburization as a characteristic feature of the reaction of carbon. Blowability of basic bessemer pig iron of different composition and temperature. Effect of blast-furnace operation on behavior of carbon during blowing. Extensive tabular and graphical data. (D1, D3, ST)

290-D. (German.) **Experiments on Use of Models for Development of New Designs of Waste-Gas Pipe Bends Having Smaller Pressure Losses for Blast-Furnace Stoves.** Walter Barth, Horst Kredel, and Eugen Laforsch. *Stahl und Eisen,* v. 72, May 22, 1952, p. 617-620.

Experimental equipment and improved designs developed. Data are tabulated. (D1, Fe)

291-D. (Italian.) **Rapid Method for Investigation of the Structure of Large Ingots by Means of Explosive Charges.** Mario Signora and Giuseppe Testero. *Metallurgia Italiana,* v. 44, May 1952, p. 180-183.

Test procedure. Gives results of a number of typical tests. Diagrams and macrographs. (D9, M27, M28, ST)

292-D. (Czech.) **High Pressure Shrink-Heads.** Jan Kraus. *Hutnické Listy,* v. 7, Feb. 1952, p. 59-61; Mar. 1952, p. 124-128.

Refers to ingot casting of steel. A mixture of coke and limestone was used in the shrinkheads to develop higher pressure. The influence of size and shape of the shrinkhead on the shrinkage cavity was determined. Diagrams, graphs, tables, and macrographs. (D9, ST)

293-D. (Russian.) **The Operation of Jets in Openhearth Furnace Using Hot Compressed Air.** I. S. Dolkart. *Za Ekonomiiu Topliva,* v. 9, Apr. 1952, p. 13-14.

Savings made by using hot compressed air and petroleum residue in openhearth furnaces. (D2, ST)

294-D. Electric Furnace Melting for Steel Castings, John Howe Hall, *Foundry,* v. 80, July 1952, p. 106-109, 239-240, 242-246.

Deoxidation of steel in electric-furnace melting, use of O_2 to speed up the heat, and the coreless induction furnace. Effects of Al and other deoxidizing elements. 17 ref. (D5, CI)

295-D. Multiple Burners in Open Hearth Furnaces. Part II. H. T. Watts. *Industrial Heating,* v. 19, June 1952, p. 1045-1046, 1048, 1050, 1052, 1054, 1056.

Improvement in efficiency of furnace operation and accompanying reduction in furnace repairs. Charts and a table show pressures, temperatures, and volumes of fuels used in melting several heats upon conversion of the conventional openhearth burner to a multiple burner. (D2, ST)

296-D. Oxygen in Steelmaking. D. J. Girardi and D. C. Hilty. *Journal of Metals,* v. 4, July 1952, p. 703-708.

A resumé of the more important points brought out by the various papers given at the Oxygen Symposium of the AIME Annual Meeting. FeO in slags; distribution of Mn; O_2 equilibrium; Cr distribution; electrical conductivity; Si-O_2 equilibrium, the Fe-S-O system; metallic oxidation in Cr steel melting; sampling and analysis for O_2; O_2 and air lancing. (D general, B22, ST)

297-D. Physical Conditions in the Combustion and Smelting Zones of a Blast Furnace. J. F. Elliott, R. A. Buchanan, and J. B. Wagstaff. *Journal of Metals,* v. 4, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 709-717.

Illustrated by high-speed photography through blast-furnace tuyeres. Graphs and drawings. (D1)

298-D. Instrumentation Improves Quality of Finished Product. L. W. Heinzinger. *Steel,* v. 130, June 30, 1952, p. 90.

How instruments are used advantageously in the openhearth shop and finishing mill of Bethlehem Pacific Coast Corp., Seattle. Improvement since 1948 is shown graphically. (D2, S18, ST)

299-D. (French.) **Production of Steel in a Converter by Blowing Pure Oxygen Under the Surface of the Bath.** (Austrian Process.) Th. Suess. *Circulaire d'Informations Techniques,* v. 9, June 1952, p. 813-817. (From *Voest Jahrbuch,* 1950-51, p. 21-24.)

Details of process and advantages. (D3, ST)

300-D. (French.) **Slags and Oxides in Steel Ingots.** Marcel Guédras. *Métallurgie et la Construction mécanique,* v. 84, May 1952, p. 299-300, 303.

Modern methods for eliminating such inclusions, particularly from toolsteels and special steels. Micrographs. (D9, TS, AY)

301-D. (French.) **Use of Oxygen in Openhearth Furnaces.** J. E. Lafon. *Métallurgie et la Construction mécanique,* v. 84, May 1952, p. 305, 307, 309.

Where and when to use oxygen in combustion and in reduction. Advantages. (D2, ST)

302-D. (German.) **Metallurgy of Iron, Manganese, and Phosphorus Precipitation in Basic Steel Melts.** Erich Witten. *Archiv für das Eisenhüttenwesen,* v. 23, Mar./Apr. 1952, p. 83-93.

Proposes a theory on the mechanism of the reactions between metal and slag during smelting processes. Relationship of the various constituents of slag and their dependence upon bacisity and use of P and Mn. The equilibria involved. Practical applications of the theoretical findings. Graphs. 34 ref. (D general, B21, ST)

303-D. (German.) **The Effect of Basic Oxides on Desulfurization in Blast Furnaces.** Bernhard Weilandt, Helmut Maetz, and Willy Oelsen. *Archiv für das Eisenhüttenwesen,* v. 23, May-June 1952, p. 163-172.

Slag transformations in blast furnaces and the formation of Ca silicates. Experimental arrangement for desulfurization of pig iron; also the behavior of Mg, Ca, Sr, Ba, and Na metasilicates. The desulfurization effect of alkaline-earth oxides or Na oxides in clay silicates. Graphs. 33 ref. (D1, Fe)

304-D. (German.) **Influence of Manufacturing Conditions in the Steel Plant on the Quality of Forging-Grade Steel Ingots.** Werner Heischkeil. *Stahl und Eisen,* v. 72, June 5, 1952, p. 663-668.

Literature survey on defects in heavy forgings. Effects of Al additions, melting practice, and control of gas and air input in acid and basic openhearths. Effects of H_2 in steel. Pouring practice. Graphs. (D9, ST)

305-D. Making a Synthetic Pig Iron. F. C. Barbour. *American Foundryman,* v. 22, July 1952, p. 54-55.

How the McWane Cast Iron Co., of Birmingham, Ala., made synthetic pig iron by melting sugar-mill scrap with 50% domestic steel scrap. Melting details. (D8, CI)

306-D. A Study of Tests for the Evaluation of Coke. R. W. Campbell. *Blast Furnace and Steel Plant,* v. 40, June 1952, p. 643-650; July 1952, p. 779-786, 800.

Based on tests of blast-furnace coke used currently by a number of manufacturers. Tables. (D1, B18)

307-D. Developing the Use of Coke Oven Gas in the Open Hearth Sparrows Point Plant of Bethlehem Steel Company. J. H. Kelley. *Blast Furnace and Steel Plant,* v. 40, July 1952, p. 773-778.

How the change to firing high percentages of coke oven gas in the openhearth increased production. Concludes that coke-oven gas can no longer be considered an inferior fuel, if supplied at the right pressure and used properly with a small amount of tar. Diagrams, tables, and charts. (D2, ST)

308-D. Steelmaking. *Iron Age,* v. 170, July 10, 1952, p. 168-169. (Condensed from a talk by L. Reeve.)

Effects of teeming speeds on ingot quality of structural steels. (D9, CN)

309-D. (Book) **The All-Basic Open-Hearth Furnace.** 92 pages. April 1952. Iron and Steel Institute, 4 Grosvenor Gardens, London S.W. 1, England. (Special Report 46).

Consists of nine papers and accompanying discussion presented at 36th Steelmaking Conference, Ashorne Hill, Leamington Spa, May 2-3, 1951. Individual papers are separately abstracted. (D2, ST)

310-D. (Book) **Das Elektrostahlverfahren, Ofenbau, Elektrotechnik, Metallurgie und Wirtschaftliches.** (Electric Steelmaking: Furnace Design, Electrical Equipment, Metallurgy, and Economics). Ed. 2. Heinz Siegel. 432 pages. Springer Verlag, Berlin, Germany. DM 31.50. (Based on "Manufacture of Electric Steel", by F. T. Sisco.)

Primarily for electric-furnace operators, both arc and induction. Electrodes and electrical equipment of arc furnaces. Energy consumption and furnace losses in relation to output. High-frequency induction furnaces, planning and building of new electric steelworks, furnace refractories, furnace charges, additions, alloying elements, and fluxes. Arc-furnace metallurgy is dealt with from the viewpoint of the practical furnace operator. (D5, ST)

E

FOUNDRY

410-E. Standardizing Casting Practice. A. S. Grot and L. H. Carr. *American Foundryman,* v. 21, June 1952, p. 42-48.

Successful control program of Edwards Valves, Inc., in connection with manufacture of steel valves for high-pressure service throughout a wide temperature range. Diagrams, macrographs, and photographs. (E11, CI)

411-E. Lighting the Standard Cupola Without Causing Smoke. C. F. Semrau. *American Foudnryman,* v. 21, June 1952, p. 49.

Text and diagrams show recommended procedure. (E10)

412-E. Fool-Proof Sand Works for Wide Range of Castings. J. S. Schumacher. *American Foundryman,* v. 21, June 1952, p. 54-57.

Composition and characteristics of a foundry sand applicable to a wide range of casting sections. Graphs and tables. (E18)

413-E. Basic Refractories For Cupola Service. M. W. Demler. *American Foundrymen's Society,* Preprint 52-20, 1952, 4 pages.

Refractories used for acid practice as compared with those required for basic practice. Application of basic refractories for cupola linings. (E10)

414-E. Report of Committee B-6 on Die-Cast Metals and Alloys. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 167-193; disc., 193-197.

Previously abstracted from Preprint 11, item 359-E, 1951. (E13, Al)

415-E. Report of Committee B-6 on Die-Cast Metals and Alloys. *American Society for Testing Materials,* Preprint 12, 1952, 7 pages.

Recommendations for changes in standards and specifications and discussion of paper by W. Babington and D. H. Kleppinger on Al die castings (*American Society for Testing Materials, Proceedings,* item 359-E, 1951). (E13, Al)

416-E. An Exothermic Feeding Compound: Its Use With Steel Castings. E. Lazendorfer. *Iron & Steel,* v. 25, June 1952, p. 283-288.

Experiences with a British material, Feedex, with the outstanding feature of being moldable and capable of fabrication into any desired shape. Gives marked reduction in riser size. Examples cover an unspecified steel, 12-14% Mn steel, high alloy Cr-Ni steel, and Mn bronze. Photographs, graphs, and micrographs.
(E25, ST, CI, SS, Cu)

417-E. New Die Caster for Aluminum, Zinc, or Copper Alloys. *Light Metals,* v. 15, June 1952, p. 196.

Machine which will cast Al, Zn or Cu alloys without the necessity of a major conversion. Other advantages. Chart of working data. (E13, Al, Zn, Cu)

418-E. Designing With Ductile Iron. John L. Goheen. *Machine Design,* v. 24, June 1952, p. 161-166.

Survey of the characteristics of ductile iron with pertinent information on important design considerations. Foundry practice. Charts, photographs, photomicrographs, and a table of mechanical, physical and machining properties.
(E general, P general, Q general, G17, CI)

419-E. Reduction of Development Costs in Die Casting. H. K. Barton. *Machinery* (London), v. 80, May 29, 1952, p. 942-950.

Recommended procedures. Includes list of questions to be checked, and diagrams. (E13)

420-E. Sealing Porous Castings by Vacuum Impregnation. *Machinery* (London), v. 80, May 29, 1952, p. 959-960.

Application to phosphor bronze casings of impeller-type water pumps for fire engines, by a British firm. (E25, Cu)

421-E. Basic Lining for Cupolas. *Metal Progress,* v. 67, June 1952, p. 91.

Advantages and disadvantages. Experiences of American Cast Iron Pipe Co., Birmingham, Ala.
(E10, CI)

422-E. Casting Revolution Picks Up Speed. *Modern Industry,* v. 23, June 15, 1952, p. 107-108, 110.

Shell molding, the new casting process that uses a resin-bonded sand shell in place of a rammed-sand flask. Process applicable to gray iron, stainless steel, bronze, Al, and Mg.
(E16, CI, SS, Cu, Al, Mg)

423-E. Steel Foundry Refractories. R. Groves. *Refractories Journal,* May 1952, p. 209-213.

The three main types.
(E general, ST)

424-E. (French.) Experimental Study on the Efficiency of Recirculation in Foundry Furnaces. Part One. M. Georges Ulmer. *Fonderie,* May 1952, p. 2917-2926.

Experiments on an industrial scale. Experimental arrangement. Results and their interpretation. Tables, charts, diagrams, and photographs. (To be continued.) (E10)

425-E. (French.) Fluidity of Binary Sn-Zn and Al-Zn Alloys. V. Kondic and T. P. Yao. *Revue de Métallurgie,* v. 49, May 1952, p. 321-326; disc., p. 326-327.

Fluidity experiments using mostly the eutectic compositions. Experimental arrangement and results. Diagrams, graphs, and micrographs. (E25, Sn, Al, Zn)

426-E. Large Parts, Intricate Shapes, Difficult Metals, Are Possible With Skilled Investment Casting. D. F. B. Tedds. *American Machinist,* July 7, 1952, v. 96, p. 141-146.

Diagrams and illustrations show details of varied applications. (E15)

427-E. Used Moulding Sand Reclaimed by Air Scrubbing. H. H. Fairfield, James McConachie, and H. F. Graham. *Canadian Metals,* v. 15, June 1952, p. 36, 38-40.

Process at William Kennedy & Sons, Ltd., Owen Sound, Ont. Properties of the reclaimed sand. Tables and layout diagram. (E18)

428-E. Grain Size and Permeability of Foundry Sands. Philippe Jasson. *Engineers' Digest,* v. 13, June 1952, p. 194. (Translated and condensed.)

Previously abstracted from *Fonderie.* See item 266-E. 1952. (E18)

429-E. Plastics Remold the Foundry. Francis Bello. *Fortune,* v. 46, July 1952, p. 104-107, 140, 143.

Current status of the shell-molding process. (E16)

430-E. Automatic Devices Facilitate British Foundry Operations. Vincent Delport. *Foundry,* v. 80, July 1952, p. 87-91.

Electrical units employed by Ferranti Ltd., of Great Britain, for automatically adding inoculant to cupola iron and for measuring the moisture content of molding sand. Photographs and circuit diagram. (E10)

431-E. Investments for the Precision Casting Process. William F. Davenport and Adolph Strott. *Foundry,* v. 80, July 1952, p. 92-93, 192, 194, 196.

A study of the feasibility of using less critical materials for investments in precision casting work indicates that low-priced foundry sands can be used as the refractory. Satisfactory results were obtained employing such binders as phosphate salts, plaster, and alumina-base cement. Tables. (E15)

432-E. Production of Aluminium-Nickel Bronze Sand Castings. Vincent De Pierre and Richard C. Wynne, *Foundry,* v. 80, July 1952, p. 94-97, 247-249.

Production practices employed at the U. S. Naval Gun Factory, Washington, for Al-Ni bronze sand castings. Properties of these castings. Diagrams, tables, and photographs. (E11, Cu)

433-E. Model Castings Developed for Huge Forging Press. *Foundry,* v. 80, July 1952, p. 98-99.

Production of Al model castings for very large forging presses at Alabama Polytechnic Institute.
(E general, T5, Al)

434-E. Modernized Foundry Boosts Castings Output. Robert H. Herrmann. *Foundry,* v. 80, July 1952, p. 100-105, 216, 218.

How the Dodge Mfg. Corp., Mishawaka, Ind., manufacturer of power-transmission machinery, increased production 50% by rebuilding, redesigning, and mechanizing a section of its foundry. (E11)

435-E. Effect of Blacking Additions to Core and Molding Sands. Theodore H. Burke. *Foundry,* v. 80, July 1952, p. 110-111, 234-235.

Studies were conducted by the Worthington Corp., Buffalo, N. Y. to find a suitable but inexpensive material to incorporate in the core-sand mixture which would withstand the severe conditions imposed by the large volume of metal surrounding the cores. Tables, graphs, and photographs. (E18)

436-E. Current Status of the Shell Molding Process. Roy W. Tindula. *Foundry,* v. 80, July 1952, p. 201-202, 204, 206, 208, 210.

The present status of the process including both technical procedures and patent implications. The information was released by the U. S. Dept. of Commerce and includes a discussion of the major developments in shell molding. 36 ref. (E16)

437-E. Effect of Raw Materials on Cupola Operation. Bernard P. Mulcahy. *Foundry,* v. 80, July 1952, p. 211-212, 214, 216, 218.

Precautions to observe in the use of steel scrap and foundry returns in the cupola metal charge.
(E10, Fe, ST)

438-E. New Device Charges Loose Borings Into Cupola. *Foundry,* v. 80, July 1952, p. 220.

New method of reclaiming cast-iron borings in the cupola developed by Crofts (Engineers) Ltd., Bradford, England. (E10, CI)

439-E. Grain Refinement of Non-Ferrous Castings. G. Swinyard. *Foundry Trade Journal,* v. 92, June 19, 1952, p. 647-652.

Advantages and disadvantages of a fine-grained structure; estimation of grain refinement; theory of concentration gradients; and nucleation in the melt. Grain refinement of Al, Mg, and Cu and their alloys. 19 ref. (E25, Al, Mg, Cu)

440-E. Shell Molded Stainless Valves and Fittings Now in Production. G. F. Sullivan. *Iron Age,* v. 169, June 26, 1952, p. 112-116.

Shell molding at Cooper Alloy Foundry, Hillside, N. J. Increase in metal yield of 20-35% plus better tolerance, smoother finish, and cleaner working conditions are claimed. Types 304 and 316 stainless are used. (E16, SS)

441-E. An Investigation of the Gaseous Thermal-Decomposition Products of Linseed Oil. J. M. Horspool, K. A. R. Julian, and Graham Oldham. *Journal of Applied Chemistry,* v. 2, May 1952, p. 283-287.

Method developed for investigation of the above products of linseed oil when used as core binders. The method is suitable for similar investigations on other core-binding materials. Products of decomposition between 400 and 800° C. were investigated as well as effect of preliminary heat treatment of the core on composition of the gas. Tables and graphs. (E18)

442-E. The Trial and Development of Die Casting Dies. H. K. Barton.

Machinery (London), v. 80, June 26, 1952, p. 1124-1132.

General development procedure; disposition of vents; local venting requirements; alterations to gates; control of cavity temperature; use of remote gates and blind runners; and establishing production time. (E13)

443-E. Sand-Cast Beryllium-Bronze. L. Grand. *Metal Industry,* v. 80, June 13, 1952, p. 481-484, 489.

Composition; casting technique; and effects of impurities; Al, Be content, increasing tempering temperature, mold material, and mold arrangement on mechanical properties. Photomicrographs, photographs, and tables. (E11, Q general, Cu, Be)

444-E. No Cure-All for Die Casters but Die Lubricants Smooth Performance. V. W. Smith. *Steel,* v. 130, June 30, 1952, p. 82, 84, 86.

The main purpose of the die lubricant—to prevent wear. Several specific lubricants. (E13)

445-E. (French) **Improvement in the Preparation of Gadolinium-Magnesium Alloys.** Francoise Gaume-Mahn. *Journal des Recherches du Centre National de la Recherche Scientifique,* Mar. 1952, p. 113-117.

Various methods, such as fusion of Gd and Mg under pressure of an inert gas, replacing a halide of Gd by Mg, and new methods used in this investigation. Data are tabulated. 11 ref. (E10, Mg, Gd)

446-E. (French.) **Square and Filleted Angles in Die Casting.** R. Grunberg. *Métallurgie et la Construction mécanique,* v. 84, May 1952, p. 311, 313.

Optimum shapes for die casting. Advantages of correct angle formation. Example of a zinc die casting. Diagrams and photograph. (E13, Zn)

447-E. (French.) **Internal Stresses and Service Life of Molds for Centrifugal Castings.** Hans Bühler. *Métaux: Corrosion—Industries,* v. 27, Apr. 1952, p. 164-168.

Above relationship was investigated. Tables and graphs contain data on special low-alloy steels for such molds, and on factors affecting their service life. (E14, Q25, AY)

448-E. (German.) **Determination of the Formation of Shrinkage Cavities in Malleable Cast Iron.** A. Bordes. *Giesserei,* v. 39, May 1, 1952, p. 201-203.

New method facilitates determination of the tendency toward formation of shrinkage cavities, and of the various factors acting upon it. Diagrams and photographs. (E25, CI)

449-E. (German.) **Suggestions for Examination of Core Sands, Core Binders, and Cores.** F. Roll. *Giesserei,* v. 39, May 1, 1952, p. 203-207.

Chemical, microscopic, physical, and technological suggestions for examining cores and core materials, on the basis of the literature. 31 ref. (E21, E18)

450-E. (German.) **The Sand Triangle.** H. Jungbluth. *Giesserei,* v. 39, May 15, 1952, p. 225-232.

Problems of foundry-sand test standardization in Germany. Method suggested by W. Reitmeister, as discussed by W. Götz. Numerous graphs. (E18)

451-E. Vampire Canopy: the Construction of the de Havilland Night-Fighter Cockpit Enclosure. Part I. Castings. *Aircraft Production,* v. 14, June 1952, p. 186-190.

Production of Mg alloy and Al alloy sand castings for airplane cockpit. Molds, pouring, and pattern construction. (To be continued.) (E11, Mg, Al)

452-E. Oxygen in the Malleable Foundry. J. B. LaPota and L. H. DeWald. *American Foundryman,* v. 22, July 1952, p. 35-41.

Merits of oxygen for better melting and annealing. Graphs and diagrams. (E10, J23, CI)

453-E. Easier, Surer Identification With Colored Core Sands. L. C. Voss and W. W. Lynn. *American Foundryman,* v. 22, July 1952, p. 44-45.

How to add small additions of organic dyestuff to core sands to lend a characteristic color. This aids in distinguishing one sand from the other, shows undermixing, prevents poor distribution or mixing of sand, indicates faulty core structure, and points out uncured cores. (E18)

454-E. Shell Mold Process Casts Stainless. Irving Stone. *Aviation Week,* v. 57, July 14, 1952, p. 33-34, 36, 38, 41.

Work of Cooper Alloy Foundry Co., Hillside, N. J. (E16, SS)

455-E. Carbon Pick-Up. H. T. Angus. *British Cast Iron Research Association Journal of Research and Development,* v. 4, June 1952, p. 360-364.

Relative value of various methods by which improved carbon pickup has been attempted for iron castings. Methods of raising and factors promoting carbon pickup. (E25, CI)

456-E. Flow of Metal. *Foundry Trade Journal,* v. 92, June 26, 1952, p. 673-680.

Results of an experimental study, using motion-picture photography. Normal green-sand molds, open at the top, were used. 16 illustrations show frames from 10 series of shots representing different pouring situations. (E23)

457-E. Probable Trends in British Steelfoundry Practice. F. Cousans. *Foundry Trade Journal,* v. 92, June 26, 1952, p. 685-688.

Steelmaking, other melting factors, sand practice, molding, coremaking, the "C" process, cleaning and dressing, materials handling, production control and planning, training schemes, housekeeping, and foundry methods. (E general, D general, CI, ST)

458-E. Cores Instead of Loose Pieces. F. H. Wakeham. *Foundry Trade Journal,* v. 92, June 26, 1952, p. 691.

Casting of a brake pulley almost entirely by use of cores. Use of three cores dispenses with necessity of a three-part mold, and with loose pieces on the pattern. Diagrams. (E21)

459-E. Gas Removal From Molten Aluminium Alloys. A. W. Brace. *Foundry Trade Journal,* v. 93, July 3, 1952, p. 3-11.

Reviews the work that has been done on the removal of dissolved gas, mainly H_2, from molten Al alloys. Mechanism of gas absorption and removal, including sources of hydrogen, mechanism of absorption, factors affecting porosity and its distribution, and conditions for removal of gas from the melt. Application in production of castings under normal foundry conditions. Effect of chlorine and volatile chlorides on the soundness of castings. 23 ref. (E25, Al)

460-E. Knock-Off Feeding Heads. J. R. Robinson. *Foundry Trade Journal,* v. 93, July 3, 1952, p. 13-19.

Two practical methods of feeding castings are use of exothermic core compounds, and use of the Connor block or hot lip-runner. (E23)

461-E. Qualities Required in Corebinders. D. Lane. *Foundry Trade Journal,* v. 93, July 3, 1952, p. 21-22.

Properties of corebinders, with particular reference to those used for oil-sand cores. Suggests various combinations of binders to suit particular purposes. Not confined to resins. (E18)

462-E. The Effect of Metal-Mould Reaction on 85:5:5:5 Leaded Gun-Metal Sand Castings. N. B. Rutherford. *Journal of the Institute of Metals,* v. 80, June 1952, p. 555-568.

Effect of gas absorption on strength and pressure-tightness. Varying degrees of metal-mold reaction were induced in 85:5:5:5 leaded gun-metal by casting it into green-sand molds at four pouring temperatures between 1050 and 1200° C., and by varying the residual P content from 0.002 to 0.15%. Effect on the properties was determined from tensile test-pieces. The work was designed as a factorial experiment, and the results were examined by statistical methods. Some production trials, together with notes on fracture and grain size. Diagrams, graphs and photographs. 19 ref. (E23, Q27, M27, Cu)

463-E. Internal Cam at Low Cost by Die Casting. S. Broadwin. *Precision Metal Molding,* v. 10, July 1952, p. 27.

How a marked decrease in machining time was secured by incorporating a camming surface, a housing, and cam pins into a Zn die casting used in a knitting machine. (E13, Zn)

464-E. Effective Use of Die Castings for Limited Production Runs. *Precision Metal Molding,* v. 10, July 1952, p. 28-30.

Use of Zn die castings in check perforators. In spite of short runs, die castings are economical. (E13, Zn)

465-E. The White Sewing Machine. A Good Example of Design for Molded Precision Parts. Lovell Shockey. *Precision Metal Molding,* v. 10, July 1952, p. 33-35, 78.

Foundry practices at White Sewing Machine Corp., Cleveland. Changes made over a period of years and reason for each change. Die castings investment castings, and powdered metal parts in miscellaneous ferrous and nonferrous metals. (E13, E15, H general)

466-E. Designer-Foundry Collaboration Uses Advantages of Plaster Mold Casting. J. B. Savits. *Precision Metal Molding,* v. 10, July 1952, p. 36-38, 41.

Manufacture of metal gripper "fingers" used in tea-bag assembly with plaster-mold castings of Mn bronze. (E16, Cu)

467-E. Component Inventory Reduced by Investment Casting. *Precision Metal Molding,* v. 10, July 1952, p. 43.

Simplification of typewriter margin-stop manufacture by conversion from a plurality of machined parts assembled by brazing to investment casting in Be-Cu. (E15, Cu)

468-E. Automatic Core Maker Pneumatically Powered. *Product Engineering,* v. 23, July 1952, p. 140-141.

Machine made by Osborn Mfg. Co., Cleveland. Photographs and diagrams. (E21)

469-E. How Northrop Aircraft Vacuum Impregnates Metal Castings. Thomas A. Dickinson. *Steel,* v. 131, July 14, 1952, p. 88-90.

Specialized techniques adapted to impregnating Al and Cu alloys with sodium silicate, vinyl lacquers, styrene, and phenol-formaldehyde resins. (E25, Al, Cu)

470-E. (Book) **Patternmaking.** L. L. Cox. Sir Isaac Pitman & Sons, Ltd., Parker St., Kingsway, London, W.C. 2, England. 12s., 6d.

The making of wooden patterns. The illustrations, sketches, and examples are clear, comprehensive and up-to-date. Questions follow each of the 19 chapters. (E17)

471-E. (Book) **Defauts de Fonderie.** (Foundry Defects.) Francois Boussard. 424 pages. 1952. Dunod, 92 Rue Boneparte, Paris 6, France. 2700 fr.

72 examples of foundry defects are dealth with in detail under eight headings, broadly classified according to cause. Formation, appearance, specific cause, and remedy. Extensive tables provide a classification of defects by appearance, a listing of effective precautions, and an international numerical classification for indexing defects. (E general)

F

PRIMARY MECHANICAL WORKING

184-F. The Theory of Tube Producing Methods. E. J. Ripling. *American Institute of Mining and Metallurgical Engineers,* "Tube Producing Practice", 1951, p. 1-16; disc., p. 16.

Only the plastic forming operations are discussed; other forming processes such as casting shells are not considered. Graphs and illustrations. 15 ref. (F26)

185-F. The Production of Aluminum and Aluminum Alloy Tubing. T. F. McCormick. *American Institute of Mining and Metallurgical Engineers,* "Tube Producing Practice", 1951, p. 17-31; disc., p. 31.

Commercial equipment and procedures of Alcoa. Includes ingot casting, hydraulic extrusion, cold working, tube reduction, annealing operations, and mechanical properties of product. 11 ref. (F26, C5, J23, Q general, Al)

186-F. The Production of Copper and Copper Alloy Tubes. H. Y. Bassett. *American Institute of Mining and Metallurgical Engineers,* "Tube Producing Practice", 1951, p. 32-55; disc., p. 55-56.

The various major operations used in nonferrous tube mills. Includes billet casting, extrusion, piercing, drawing, finishing, annealing, inspection, packing, and shipping. (F26, C5, J23, S13, Cu)

187-F. The Metallurgical Factors Affecting the Production of Seamless Pipe. J. W. Schroeder. *American Institute of Mining and Metallurgical Engineers,* "Tube Producing Practice", 1951, p. 57-66; disc., p. 66-68.

Effects of variation in steelmaking practice. 12 ref. (F26, D general, ST)

188-F. The Production of Lead Tubes. G. O. Hiers. *American Institute of Mining and Metallurgical Engineers, "Tube Producing* Practice", 1951, p. 69-82.

Procedures and equipment for production of lead pipe and also lead cable sheath. 44 ref. (F26, Pb)

189-F. The Production of Nickel and High Nickel Alloy Seamless Tubing. W. A. Dickinson and H. F. Hendershot. *American Institute of Mining and Metallurgical Engineers,* "Tube Producing Practice", 1951, p. 83-100; disc., p. 100-101.

Past and present methods employed by the Huntington Works of International Nickel Co. The various operations for both hot and cold processing are considered in their natural sequence, together with processing characteristics of the high-Ni alloys and the equipment used. (F26, Ni)

190-F. The Production and Properties of Magnesium Alloy Tubing. C. J. Huffman and G. Ansel. *American Institute of Mining and Metallurgical Engineers,* "Tube Producing Practice", 1951, p. 102-107.

Compositions, typical mechanical properties, and extrusion methods and equipment. (F26, Q general, Mg)

191-F. Heavy Forging Practice. G. A. Burrell. *Australasian Engineer,* Apr. 7, 1952, p. 46-56.

Comprehensive review. Includes tabulation of heavy-duty forging presses in various parts of the world, and description of heat-treatment methods, properties, and testing. 10 ref. (F22, ST)

192-F. Crankshaft Forging; Details of the New R. R. Continuous Grain-Flow Process. *Australasian Engineer,* Apr. 7, 1952, p. 109, 111-113, 115, 117. (Based on article by J. M. Vialle and J. Lafont.)

Previously abstracted from *Métallurgie et la Construction Mécanique.* See item 96-F, 1952. (F22, CN)

193-F. Precision Forging of Turbine Vanes, Blades and Buckets. *Automotive Industries,* v. 106, June 15, 1952, p. 34-35, 87-88.

Procedures at the Mt. Elliott Plant, Packard Motor Car Co., said to be first mass-production setup by an automobile manufacturer. Parts are made of stainless steel or high-temperature alloy. A new horizontal impact forging machine developed by Chambersburg Engineering Co. (F22, SS, SG-h)

194-F. Universal Tube and Section Mill. *Engineering,* v. 173, May 30, 1952, p. 669-672.

Equipment made by a British firm to produce not only welded tube in a variety of materials and cross-sections, but also a similarly wide range of cold rolled sections, all at one pass through the machine. Certain other operations, such as piercing, embossing, or indenting, can also be carried out, if required, by the use of auxiliary equipment. (F26)

195-F. Wheels and Discs: New Mill at Steel, Peech and Tozer's Ickles Works. *Iron & Steel,* v. 25, June 1952, p. 279-281.

Production of above items in the given British plant. Major aspects include operation of a 6000-ton wheel forging press and a vertical rolling mill, and heat treatment details. (F22, F23, J general, ST)

196-F. Temper Mill Symposium. Temper Rolling. J. F. Sellers, R. M. Peeples, and A. C. Halter. **Power Requirements.** Wm. P. Smith and J. E. Butler. *Iron and Steel Engineer,* v. 29, June 1952, p. 76-94; disc. 95-97.

Temper rolling and its power requirements. Numerous graphs and tables. (F23)

197-F. Symposium on Soaking Pits, at South Works. G. Primm. **At Indiana Harbor Works, Youngstown Sheet & Tube Co.** H. B. Helm. **At Wisconsin Steel Works.** R. N. Powel. **At Inland Steel Co., East Chicago, Ind.** P. C. Singleton. *Iron and Steel Engineer,* v. 29, June 1952, p. 98-102; disc., p. 102-105.

Soaking-pit operations at above plants. (F21)

198-F. New Tube Extrusion Process at Babcock & Wilcox Co. *Iron and Steel Engineer,* v. 29, June 1952, p. 106-110.

See abstract of "Fiberglass Sheath the Secret: New Method Makes Extrusion Practical." *Steel,* item 171-F, 1952. (F24, SS, Mo, Ti)

199-F. Powder Metallurgy vs. Drawn Wire Method of Producing Gears. John Rigby. *Metal Powder Association,* "Proceedings, Seventh Annual Meeting", 1951, p. 59-66; disc., p. 66-67.

Points out that "all wire is not necessarily cylindrical". Irregular shapes may be extruded, then sliced off to produce gears, etc. Procedures and equipment. Relative merits as compared with powder metallurgy. (F24, H general)

200-F. High Speed on the Prop Line. Laurence Critchell. *Steelways,* v. 8, May 1952, p. 11.

Extrusion in the manufacture of propeller blades made of Ni-Cr-Mo steel. (F24, SS)

201-F. Through the Billet Mill. *Steelways,* v. 8, May 1952, p. 16-17.

Colored diagrams describe billet rolling—the intermediate steelmaking stage between the ingot and finishing mill. (F23, ST)

202-F. (Czech.) Modern Research Practices in Rolling Mills. Eduard Krasmar. *Hutnické Listy,* v. 7, Apr. 1952, p. 182-186.

Discusses the above from the point of view of increasing production of rolled shapes. Extensive tabular data. (F23)

203-F. (German.) Foreign, in Particular Swedish, Steel-Bar and Wire-Rod Rolling Mills. Theodor Dahl. *Stahl und Eisen,* v. 72, May 22, 1952, p. 605-611.

Swedish steel-bar rolling mills. Mill stands of special design. Roller guides. Mechanization of American steel-bar rolling mills. Morgoil bearings. Single drives in open finishing trains. American and Swedish wire-rod rolling mills. Prospects. Diagrams and illustrations. (F27, ST)

204-F. (German.) Deformation Conditions in Rail Rolling Using the Thyssen-Type Roll-Pass Design. Hellmuth Vollmacher. *Stahl und Eisen,* v. 72, May 22, 1952, p. 611-616.

How to avoid cracks by a more thorough working of the material to be rolled in the axial direction of pressure by means of special processes and roll-pass designs. Comparison of the flow of material with the Thyssen-type roll-pass design and rolling processes used formerly. Influence of this design on strength properties of the rail foot. (F23, CN)

205-F. New Tube Extrusion Process at Babcock and Wilcox Co. *Industrial Heating,* v. 19, June 1952, p. 998-1000, 1002, 1004, 1006, 1008, 1010, 1012, 1014, 1016.

See abstract of "Fiberglass Sheath the Secret: New Method Makes Stainless Extrusion Practical". *Steel,* item 171-F, 1952. (F24, SS, Mo, Ti)

206-F. Furnaces and Mechanical Equipment for Forging and Forming of Metals and Alloys. Hale A. Clark. *Industrial Heating,* v. 19, June 1952, p. 1026, 1028, 1030, 1032, 1034, 1036, 1038.

The art of forging and three methods of heating. (F22, F21)

207-F. Principles of Continuous Gauge Control in Sheet and Strip Rolling. W. C. F. Hessenberg and R. B. Sims. *Institution of Mechanical Engineers, Proceedings,* sec. A, v. 166, No. 1, 1952, p. 75-81; disc., p. 81-90.

Previously abstracted from *Sheet Metal Industries.* See item 33-F, 1952. (F23, S14)

208-F. Tough Alloy Steels Successfully Hot Extruded. *Iron Age,* v. 170, July 3, 1952, p. 120-121.

See abstract of "Fiberglass Sheath the Secret: New Method Makes Stainless Extrusion Practical." *Steel,* item 171-F, 1952. (F24, SS, Mo, Ti)

209-F. Stretch-Flattening Machine Rolls Internally Stiffened Aluminum Skin Sections. *Light Metal Age,* June 1952, p. 21. (F29, Al)

210-F. Design of Forging Machine Tools. E. W. Mace. *Metal Treatment and Drop Forging,* v. 19, June 1952, p. 263-264, 274.

The design of tools and calculations involved in upset forging a simple axle shaft. Tables and diagrams. (F22, ST)

211-F. Lubrication in Steel Wire Drawing; Modern German Ideas. J. G. Wistreich. *Metal Treatment and Drop Forging,* v. 19, June 1952, p. 273-274.

Recent German trends of thinking. Includes brief treatment of good and bad lubricants and practical aids. (F28, ST)

212-F. Efficient Extrusion Set-Up Pays Off for Aluminum Product Manufacturer. D. O. Stiles and J. S. Gray. *Modern Metals,* v. 8, June 1952, p. 42-44.

Extrusion setup of Valley Metal Products Co., used in production of Al windows. The second and bigger extrusion press now being installed will greatly extend service to other extrusion customers. (F24, Al)

213-F. Warragamba Pipeline. W. I. Miskoe. *Welding Engineer,* v. 37, July 1952, p. 23-25, 64-65.

Construction of Australian water pipeline. Rolling, welding, cleaning, and coating procedures. Welding processes include automatic submerged-arc and manual-arc applied in butt, lap, tack, and fillet welds. Photographs.
(F26, K1, L general, ST)

214-F. Bonderizing for Wiredrawing. *Wire Industry,* v. 19, June 1952, p. 537-545.

Development of Bonderizing process by a British firm. Includes introduction by Peter Smith and the following papers: "The Development and Control of the Bonderizing Process for Wiredrawing", W. A. Sandilands; and "The Application of Bonderizing for Wiredrawing", C. Coates. (F28, L14, CN, Zn)

215-F. (French.) **Drawing of Metallic Wires.** M. Bonzel. *Métaux: Corrosion—Industries,* v. 27, Apr. 1952, p.144-149.

Theory and practice. The shape and temperature of the wire; preparation of the surface of the wire, lubricants, and various wiredrawing machinery. (F28)

216-F. (German.) **Calculation of Drawing-Die Diameters for Multiple Drawing Machines.** Werner Lueg. *Archiv für das Eisenhuttenwesen,* v. 23, Mar./Apr. 1952, p. 95-101.

Proposes a graphical method for determining the mean diameter of wiredrawing dies, based upon the method of E. L. Baay. Method for development of a generally valid diagram for this purpose. Use of a slide rule for rapid determination of drawing-die diameter and related factors. Diagrams and graphs. (F28)

217-F. (German.) **Steels for Large Forgings.** Sepp Ammareller and Paul Grün. *Stahl und Eisen,* v. 72, June 5, 1952, p. 653-662; disc., p. 662.

Production, forging, and testing of large ingots. Inspection for surface-finish defects. Relationship of strength properties to those required in service. Alloy content of foreign and domestic steels. Tables and diagrams. (F22, D9, Q23, ST)

218-F. (German.) **Influence of Manufacturing Conditions on Properties of Large Forgings for Steam Turbines.** Rudolf Schinn. *Stahl und Eisen,* v. 72, June 5, 1952, p. 676-683; disc., p. 683.

Influence of size of ingot, degree and kind of forging on properties. Significance of chemical composition. Heat treatment and quenching and resulting stresses. Mechanical and ultrasonic testing. Tables, diagrams, graphs, and micrographs. 31 ref.
(F22, D9, J26, Q general, S13, ST)

219-F. (German.) **Forging Manipulators.** Walter Knackstedt. *Stahl und Eisen,* v. 72, June 5, 1952, p. 668-675.

U. S. and German types, their installation and use. Diagrams, tables, and illustrations. (F22)

220-F. Upset Blades. *Aircraft Production,* v. 14, July 1952, p. 227-229.

Application of Omes electroforging process to production of gas-turbine rotor and stator types. The material is heated by a low-voltage current passed through the billet itself. Passage of current is confined to the portion of the bar which is to be upset and forged. Diagrams and illustrations. (F22)

221-F. The Ugine-Sejournet Extrusion Process. Jerome Strauss. *American Iron and Steel Institute,* Preprint, 1952, 15 pages.

Process developed by a French firm for extrusion of complex shapes in ferrous and nonferrous metals and alloys. A glass-fiber sheath serves as the lubricant. (F24)

222-F. An Examination of Modern Theories of Rolling in the Light of Rolling Mill Practice. (Continued.) N. H. Polakowski. *Sheet Metal Industries,* v. 29, July 1952, p. 581-586, 594.

Forward slip in rolling; effect of tension on forward slip; and relations between draft, forward, and backward slip. Data for carbon-steel strip. Diagrams and table. 12 ref. (To be continued.) (F23, CN)

223-F. Rammed Shell Cases. *Steel,* v. 131, July 14, 1952, p. 90.

How Army Chemical Corps' fast-ramming method produces mortar and gas shells from seamless steel tubing in 22 sec. per shell. (F26, ST)

224-F. Drawing of Aluminum Wire. J. S. Urbanik. *Wire and Wire Products,* v. 27, July 1952, p. 676-677, 711.

History and present practice in the U. S. and abroad. (F28, Al)

225-F. (Book) **Tube Producing Practice.** 107 pages. 1951. American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y. (Institute of Metals Div., Symposium Series, Vol. 4.)

An introductory paper which interprets the theory of tube-producing methods in terms of practical problems is followed by a number of papers on practices found in individual metal industries. The particular industries treated differ somewhat from those described in previous symposia. For the first time in the series, lead is discussed and the ferrous industry is described. Individual papers are separately abstracted. (F26)

226-F. (Book) **Die Berechnung der Kräfte und des Kraftbedarfes bei der Formgebung in bildsamen Zustande der Metalle.** (The Calculation of Forces and Power Requirements in Plastic Forming of Metals.) Alexander Geleji. 248 pages. 1952. Akademiai Kiado, Budapest, Hungary. 40 Forint.

Written for designers of metal-forming machinery. Chapters cover forging and pressing; flat rolling; rotary piercing and Pilger rolling; wire, bar, and tube drawing; hot extrusion; plate binding; and deep drawing. (F general, G4)

G
SECONDARY MECHANICAL WORKING

324-G. The Theory of Plasticity Applied to a Problem of Machining. *Journal of Applied Mechanics,* v. 19 (*Transactions of the American Society of Mechanical Engineers,* v. 74), June 1952, p. 234-239.

Discussion, including authors' reply, of above paper by E. H. Lee and B. W. Shaffer (Dec. 1951 issue; item 46-G, 1952.). Graphs and photomicrograph. 16 ref. (G17, Q23)

325-G. Oxy-Acetylene Processes. E. P. Auler. *Industry and Power,* v. 62, June 1952, p. 83-87.

Oxyacetylene processes for manufacture and assembly of steel pipe, fittings, and equipment into integral systems for conveying liquids and gases. (G22, ST)

326-G. Tools for the Impact Extrusion of Magnesium. *Machinery* (London), v. 80, June 5, 1952, p. 982-986.

See abstract of "Magnesium Impact Extruded", T. L. Patton, *Iron Age;* item 329-G, 1951. (G5, Mg)

327-G. Relative Workability of Representative Stainless Steels. *Materials & Methods,* v. 35, June 1952, p. 135.

Data sheet gives qualitative data on amenability of six types of stainless steel to annealing, blanking, brazing, coining, deep drawing, embossing, hot and cold forming, grinding, hardening, machining, punching, polishing, flaring, upsetting, and welding.
(G general, J general, K general, L10, SS)

328-G. Fast Cutting of Metal by Better Mechanical and Metallurgical Engineering. *Metal Progress,* v. 67, June 1952, p. 94-96, 120, 122.

Summary of proceedings of panel discussion of machinability. Temperature effects; tool erosion by coolants; selection of carbide cutters and causes of their failure; microstructure vs. machinability; and "flame washing"—flame cleaning of castings. (G17, L10)

329-G. Wax Lubricants for Use in Production of Metal Stampings. *Modern Industrial Press,* v. 14, May 1952, p. 6, 8, 44.

Use of wax lubricants in the stamping industry. (G21)

330-G. Pressing, Trimming, and Welding a Liquid Nitrogen Sphere. Fred M. Burt. *Modern Industrial Press,* v. 14, May 1952, p. 46, 48.

Operations on high-pressure vessel used in supersonic rocket engines. Design, material, and construction processes.
(G1, G15, K1, T29)

331-G. Proper Cutting Fluids Can Step up Machining. R. F. Huber. *Steel,* v. 130, June 23, 1952, p. 72-76.

Factors considered include the metal, the cutter, the specific operation, and choice of the proper cutting oil or coolant. Chart of recommendations for various steels; also several nonferrous metals and alloys. Photographs. (G21)

332-G. New Stamping Process Developed at Douglas Aircraft. Thomas A. Dickinson. *Steel Processing,* v. 38, June 1952, p. 277-278, 279.

See abstract of "Sheet-Metal Forming Without Vertical Press Movements," Gilbert C. Close. *Machinery* (American), item 316-G, 1952. (G1)

333-G. Forces in Dry Surface Grinding. E. R. Marshall and M. C. Shaw. *Transactions of the American Society of Mechanical Engineers,* v. 74, Jan. 1952, p. 51-58; disc., p. 58-59.

Dynamometer for measuring independently normal and tangential forces in surface grinding. These forces are correlated with such variables as wheel speed, table speed, depth of cut, direction of table motion, grit material and size, specimen hardness, and dressing technique. X-ray diffraction methods are employed to study surface stresses and depth of cold work induced by grinding. (G18)

334-G. The Size Effect in Metal Cutting. W. R. Backer, E. R. Marshall, and M. C. Shaw. *Transactions of the American Society of Mechanical Engineers,* v. 74, Jan. 1952, p. 61-71; disc., p. 71-72.

A cutting process involving formation of very small chips at high cutting speeds (micromilling), was investigated, and results are applied to a study of the grinding operation. Shear energy involved in grinding is compared with that in turning, micromilling, and the tensile test. 10 ref. (G17)

335-G. Surface Temperatures in Grinding. J. O. Outwater and M. C. Shaw. *Transactions of the American Society of Mechanical Engineers,* v. 74, Jan. 1952, p. 73-81; disc., p. 81-86.

Heat-transfer theory involving a moving heat source is applied to the grinding process to obtain an equation for the mean surface temperature which predicts surface temperatures as high as 3000° F. for a representative fine-grinding operation. Representative values of mean temperature between the chip and grinding wheel obtained by the tool-work-thermocouple technique. Role of the grinding atmosphere in production of sparks and in determining energy involved in grinding. Existence of high surface temperatures in fine-grinding operations is demonstrated by presence of a transformed surface layer that is largely retained austenite. (G18)

336-G. Production Cutting and Flame-Hardening. Archer B. Jones. *Welding Journal,* v. 31, June 1952, p. 469-474.

Examples of cutting and flame hardening in the manufacture of mining machinery, material handling, and conveying equipment at Jeffrey Mfg. Co., Columbus, Ohio. (G22, J2, ST)

337-G. (German.) Machining of Aluminum and Its Alloys. K. Specht. *Aluminium,* v. 28, Apr. 1952, p. 112-115.

Tool forms and operating conditions for sawing, shaping, slotting, milling, etc. Diagrams and tables of machinability of the various alloys. (To be concluded.) (G17, Al)

338-G. Die Quenching Precision-Forms Tough Alloys. Joseph S. Corral and Lyle R. Boarts. *American Machinist,* v. 96, July 7, 1952, p. 125-129.

How 50-75% savings are being realized at North American Aviation in precision-forming high-strength Al alloys by a new manufacturing technique called form-die quenching. Straightening operations are eliminated and many "impossible" jobs now can be formed to precise limits in a single press operation. (G1, Al)

339-G. Simple Zinc-Alloy Dies Speed Small Orders. J. A. Thompson. *American Machinist,* v. 96, July 7, 1952, p. 138-140.

Procedures and equipment of Short Order Dept., South-Wind Div., Stewart Warner Corp., for production of sample, experimental, spare, and emergency parts of stainless steel, sheet Al, Inconel, and other high-temperature alloys. (G3, Zn)

340-G. High Rake Angles Aid Milling Performance. Joe H. Crawford and M. Eugene Merchant. *American Machinist,* v. 96, July 7, 1952, p. 172-175.

Test results (shown graphically) indicate that high speed steel cutters give better performance by using rake angles of the order of 25-40°. Either a higher cutting speed for the same tool life, or a longer tool life for the same cutting speed, can be secured. Workpiece finish and accuracy are improved. (G17)

341-G. Titanium Tests at High Temperatures. *Automotive Industries,* v. 107, July 1, 1952, p. 74, 82, 84, 94.

Results of tests on cold forming plus annealing, hot forming, scale removal, and spot welding. A basic aim was to determine the adaptability of the machines and procedures used in forming stainless-steel components to the forming of Ti parts. (G general, K3, J23, Ti)

342-G. Tool Requirements of Tougher Alloys. *Aviation Age,* v. 17, June 1952, p. 6-15.

See abstract of "Jet Alloys Toss Challenge to Machine Tools", by P. G. DeHuff and D. C. Goldberg, *Steel;* item 234-G, 1952. (G17, SG-h)

343-G. The Effect of Diamond Wheel Grinding on the Surface Finish of Sintered Carbides. E. Dinglinger. *Engineers' Digest,* v. 13, June 1952, p. 189-193. (Translated and condensed from *Werkstattstechnik und Maschinenbau,* v. 42, Feb. 1952, p. 50-56.)

In order to reach sound conclusions from metal-cutting research, many variables, including tool angles, cutting speed and feeds, cooling, and heating must be taken into account. An additional variable which, if not controlled, can completely vitiate research results, is keenness and surface finish of the cutting tool. This was first established in machining tests on wood, plastics, and other similar materials; it was also found that the optimum finish was not necessarily the finest. It appears that various materials require varying grades of tool finish for most satisfactory machining. Data tabulated and charted. (G18, C-n)

344-G. Processes in Grinding Sintered Carbides. *Industrial Diamond Review,* new ser., v. 12, June 1952, p. 110. (Translated and condensed from article by J. Hinnüber and W. Hibbes, *Werkstattstechnik und Maschinenbau,* v. 41, Nov. 1951, p. 413-417.)

Recommended procedure using silicon or boron carbide, or diamond dust. (G18, C-n)

345-G. Continuous Filing is Economical. H. J. Chamberland. *Iron Age,* v. 169, June 26, 1952, p. 108-109.

Compares economy of band filing with that of hand or jig filing. Greatly improved accuracy and speed; also other advantages. (G17)

346-G. Spinning Techniques Solve Complex Problems of Forming. H. W. Snook. *Light Metal Age,* June 1952, p. 10-11, 22-23.

Procedures and equipment developed by El Segundo Div., Douglas Aircraft Co. (G13)

347-G. Titanium: Report on Cold Forming and General Machinability. James Joseph. *Machine and Tool Blue Book,* July 1952, p. 184-186, 188-190, 192-198, 200.

Conclusions based on work of North American Aviation, Los Angeles. Test results on a variety of operations. (G17, G general, Ti)

348-G. Hydroforming: A New Method of Deep Drawing Simple or Intricate Shapes. *Machine and Tool Blue Book,* July 1952, p. 249-250, 252, 254.

Equipment manufactured by Cincinnati Milling Machine Co. Mode of operation. (G8)

349-G. Some Features of the Impact Extrusion Procss. L. Stockman. *Machinery Lloyd* (Overseas Ed.), v. 24, June 7, 1952, p. 96-98.

Manufacture at Impact Extrusions, Ltd., Feltham, Middlesex, England, of collapsible tubes from Sn, Pb, and Al. (G5, Sn, Pb, Al)

350-G. Mass Production of Structural Steel Products. Howard E. Jackson. *Modern Industrial Press,* v. 14, June 1952, p. 13-14, 16, 18, 22, 44, 46.

Production of structural-steel metal pot-supporting cradles at Pacific Car & Foundry Co., Seattle. Operations include acetylene torch cutting, press punching, and electric-arc welding. General plant equipment. (G2, G22, K1, CN)

351-G. Panel Discussion on Magnesium. *Modern Metals,* v. 8, June 1952, p. 69-70.

Drop-hammer forming, use of beads and depressions in deep drawing, and latest developments in hot lubrication. (G4, F22, Mg)

352-G. Machining Beryllium Copper. David Birch. *Screw Machine Engineering,* v. 13, July 1952, p. 49-51.

Special problems involved. Setups are diagrammed. (G17, Cu)

353-G. Flame Tools for Scrap Cutting. R. F. Helmkamp and A. H. Yoch. *Welding Engineer,* v. 37, July 1952, p. 26-29.

How scrap too big for the charging box is being cut down to size by hand-cutting torches, oxygen lances, or mechanized flame cutting. Table of machine-cutting data for steel of constant thicknesses. (G22, A8, ST)

354-G. Shot Peening Cuts Drill Pipe Failures. Ralph Irving. *World Oil,* v. 135, July 1, 1952. p. 109-110.

Shop tests indicate life of equipment is extended by four times. (G23, ST)

355-G. (German.) Conditions of Forming in Hot Deep Drawing. Dieter Lenz. *Archiv für das Eisenhüttenwesen,* v. 23, May-June 1952, p. 173-181.

Types of material used for hot deep drawing, tools and machinery needed, and various aspects of their production. Tables, charts, and macrographs. 17 ref. (G4)

356-G. (German.) New Knowledge on Gas Cutting, and Its Application. H. Kunz. *Schweissen und Schneiden,* v. 4, June 1952, p. 204-210.

Role of selection of a cutting gas, practical methods, and economic considerations. Diagrams and photographs. (G22)

357-G. (German.) Machining Heavy Forgings in Germany. Heinrich Dürr. *Stahl und Eisen,* v. 72, June 5, 1952, p. 687-695.

Survey of equipment and procedures. (G17, ST)

358-G. (Russian.) The Influence of Thermal Deformation on the Precision of Metal-Cutting Machines. V. E. Smirnov and D. N. Reshetov. *Stanki i Instrument,* v. 23, Jan. 1952, p. 5-12.

Mathematical theory. Experimental data are charted, tabulated, and discussed. (G17)

359-G. (Russian.) Scientific Research Work of ENIMS in 1951. A. A. Padogin. *Steklo i Keramika,* v. 23, Feb. 1952, p. 1-11.

Automatization and mechanization of machines and production processes; investigation of operating processes on machines (shaping, dynamics of cutting, investigation of new methods of machining); study and determination of means of increasing strength and durability of machine parts, precision and economy of production and use of machines; investigation and development of modern construction of units and mechanisms; creation of basic machines; and preparation of proposed specifications and machine-building standards. Tables and graphs. (G17)

360-G. Grinding Titanium. *Aircraft Production,* v. 14, July 1952, p. 238-239.

Interim results on research into grinding-wheels and techniques of grinding. (G18, Ti)

361-G. USAF Puts Its Money on "Big Squeeze". Irving Stone. *Aviation Week,* v. 57, July 7, 1952, p. 38, 40, 42, 46.

Air Force program on heavy presswork for more efficient aircraft production. Seventeen huge presses are to be made available to a series of companies during the next two years. (G1)

362-G. Cost Reduction Through Cold Extrusion. *Machine Design,* v. 24, July 1952, p. 150-151.

Cold extrusion of steel parts is shown to offer the designer many opportunities formerly only possible with nonferrous metals. Typical examples illustrated. (G5, ST)

363-G. Electromechanical Machining. Malcolm F. Judkins. *Machine Design,* v. 24, July 1952, p. 230, 232, 234, 236.

See abstract of "Electro-Mechanical Machining of Hard Materials." *Tool Engineer;* item 201-G, 1952. (G17, TS, C-n, SG-m)

364-G. Hot Forming Aluminum Alloys. M. P. Meinel. *Product Engineering,* v. 23, July 1952, p. 163-165.

Need for hot forming of high-strength Al alloys; its effects on formability and mechanical properties; and selection of heating procedure. (G general, Q general, Al)

365-G. A Practical Approach to the Theory of the "Neutral Line". L. H. Park. *Sheet Metal Industries,* v. 29, July 1952, p. 597-599, 606.

Results of tests on the behavior of material during forming, to ascertain effects of plastic deformation of the crystals of which the steel is composed. Table and diagrams. (G general, Q24, ST)

366-G. Questions and Answers on "Presswork and Its Problems." *Sheet Metal Industries,* v. 29, July 1952, p. 611-623.

A report of the first meeting of the Midlands Branch of the Sheet and Strip Metal Users Technical Association. Hardness tests; Cr plating of dies; deep drawing practice; Bonderizing; lubricants; various die problems; draw bead; experiences with 17% Cr steel; specific press problems; Kirksite cutting tools; material testing; and safety guards. (G1, Q29, L17, SS, Zn, Cr)

367-G. Spark Machining: Meets Superalloy Challenge. Paul Porterfield. *Steel,* v. 131, July 7, 1952, p. 92-93.

Refinement of equipment and techniques makes spark machining a versatile tool in the processing of hard-to-machine superalloys. (G17, SG-h, m, Ti, C-n)

368-G. Grinding, Brush Finishing Done on One Machine. *Steel,* v. 131, July 7, 1952, p. 94-95.

Technique making use of principles of centerless grinding. (G18, Ni)

369-G. Metal Cutting Temperatures and Tool Wear. Part I. A. O. Schmidt. *Tool Engineer,* v. 29, July 1952, p. 33-35.

Thermocouple technique used for metalcutting temperatures. Also use of temperature-indicating colors. Graphs show variations of temperature of the tool tip with rake angle and feed for SAE 1055 and a Mg alloy. Temperature distribution in a single-point tool was also determined. (To be continued.) (G17, S16, CN, Mg)

370-G. Rheem's New Hot Cupping and Cold Drawing Cuts Critical Steel in Artillery Parts. Fred J. Wood. *Western Metals,* v. 10, June 1952, p. 39-41.

New process is a combination and modification of two well-established industrial techniques—hot forging and cold drawing. Chief advantage is a 50% Mn savings in steel billets. (G4, ST)

371-G. (Book) SAE Shot Peening Manual. 1952. Society of Automotive Engineers, 29 W. 39th St., New York 18, N. Y. $1.50 to SAE members; $3.00 to non-members.

Prepared by 24 authorities. Shot-peening for designer, process engineer, and production man; what shot peening is and does; machines and materials used. Current practice in peening various types of parts. (G23)

372-G. (Book) Protsess Obrazovaniia Poverkhnostogo Sloia pre Obrabotke Metallov Rezaniem. (Process of Surface-Layer Formation During Machining of Metals.) A. I. Isaev. 358 pages. 1950. State Scientific-Technical Publishing House for Machine-Construction Literature, Moscow, U.S.S.R.

Results of research by the Section on Machining of the Central Scientific Research Institute of Technology and Machine Construction on the process of surface-layer formation during machining. Relations between the microgeometry of the machined surface and the shape of the cutting tool in the zone of chip formation. Methods for selection of conditions necessary for production of a machined surface of given finish, such as rate of cutting, shape of the tools, cutting fluids, etc. (G17)

H

POWDER METALLURGY

80-H. Report of Committee B-9 on Metal Powders and Metal Powder Products. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 214-215.

Previously abstracted from Preprint 14; item 53-H, 1951. (H general, S22, Cu)

81-H. The "Flywheel" Effect in Infiltrated Metal Powder Parts. George Stern. *Metal Powder Association,* "Proceedings Seventh Annual Meeting", 1951, p. 14-18; disc., p. 18-21.

Iron skeletons, varying in density from 75 to 90%, were prepared from standard reduced Fe powder. The bars were pressed to approximately 70% density, sintered at 2100° F. for 1 hr. in cracked NH_3, then coined to densities between 75 and 90%. They were then infiltrated with Cu alloy to produce products varying from 85 to 100% of theoretical density. After identical heat treatment, effects of percentage infiltration on tensile strength, yield point, elongation, area reduction, and hardness were determined. Tables and graphs. (H16, Q general, Fe)

82-H. Sintered Iron Powder Rotating Bands for Ordnance Use. Alden M. Burghardt. *Metal Powder Association,* "Proceedings, Seventh Annual Meeting", 1951, p. 41-45; disc., p. 45-48.

See abstract from *Industrial Heating;* item 74-H, 1951. (H general, T2, Fe)

83-H. A Metallographic Study of the Sintering of Brass Powders. C. J. Bier. *Metal Powder Association,* "Proceedings, Seventh Annual Meeting", 1951, p. 49-56; disc., p. 56-58.

Changes in microstructure which occur on sintering brass briquettes were studied. Effects of briquetting pressure, sintering temperature, and time in the hot zone were investigated. Charts and photomicrographs. (H15, M27, Cu)

84-H. (Czech.) Some Notes on the Pressing of Powdered Materials. Curt Agte and Miroslav Petrdlik. *Hutnické Listy,* v. 7, Mar. 1952, p. 121-124; Apr. 1952, p. 190-194.

Theory and practice. Tabular and graphical data on properties of a wide variety of powdered-metal combinations. Includes calculation procedures. 13 ref. (H14, Q general, P)

85-H. (Czech.) Sintered Materials for Gas Turbines. Adolf Vambersky. *Hutnické Listy,* v. 7, Mar. 1952, p. 129-132.

Stresses the importance of powder metallurgy in the development of new alloys including metal-ceramic mixtures for very high temperatures. (H general, T25, SG-h)

86-H. Hot Molding Increases Scope of Powder Metallurgy. Jerome F. Kuzmick. *American Machinist,* July 7, 1952, v. 96, p. 132-136. (Condensed from paper presented at 8th annual meeting, Metal Powder Association.)

The equipment used, some of the applications, and advantages and limitations of the process. (H14)

87-H. Report of Committee B-9 on Metal Powders and Metal Powder Products. *American Society for Testing Materials,* Preprint 15, 1952, 7 pages.

Consists largely of proposed tentative recommended practice for evaluating microstructure of apparent porosity in cemented carbides. Includes micrographs. (H11, M27, C-n)

88-H. (German.) The Effect of Grain Size of the Powder on Behavior of Sintered Iron During Nitriding. Werner Köster and Josef Raffelsieper. *Archiv für das Eisenhüttenwesen,* v. 23, May-June 1952, p. 225-228.

Effects of grain size with absorption of Ni on density, on rate of sintering and nitriding, and on nitriding temperature. Behavior of the sintered product during machining, its corrosion resistance, and its hardness. Tables and graphs. (H15, Q29, R general, G17, Fe)

89-H. Progress in Powder Metallurgy With Special Reference to High Temperature and Hard Metal Alloys. W. D. Jones. *Journal of the Chemical, Metallurgical & Mining Society of South Africa,* v. 52, Mar. 1952, p. 216-222.

Mixing and milling; pressing; sintering; shaping; high-temperature alloys; porous metals and electrical applications; and powder manufacture. (H general, SG-h, m)

90-H. Technology of Prealloyed Stainless Steel Powders—Properties, Production, Uses. Part I. Arthur H. Grobe and George A. Roberts. *Precision Metal Molding,* v. 10, July 1952, p. 23-26, 67-70.

Growing interest in the use of pre-alloyed powders by the powder-metallurgy industry. Production methods and tables of properties. A large number of practical applications. Diagrams and photographs. (H12, T general, P general, Q general, SS)

91-H. Carbide Dies Effectively Used in Powder Metallurgy. Kenneth M. Gleszer. *Precision Metal Molding,* v. 10, July 1952, p. 31, 74-77.

How to secure maximum life from dies and punches used to mold metal powders, by using tungsten carbide dies. (H14, T5, W, C-n)

J

HEAT TREATMENT

181-J. The Fabrication of Chromium-Molybdenum Steel Piping for 1000 to 1050° F. Central Station Service. R. W. Emerson. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 869-887; disc., p. 887-894.

Certain metallurgical characteristics of the low-carbon Cr-Mo alloys indicate the possibilities of heat treating such material to a wide range of mechanical properties, depending upon the type of heat treatment specified. Factors pertinent in heat treatment of alloy steel piping to obtain good high-temperature properties. Several specific questions are raised relative to heat treatment

for obtaining best high-temperature properties at 1000 and 1050° F. Structural stability of the 2¼% Cr, 1% Mo alloy, together with impact-test data both before and after 2000 hr. at 1050 and 1150° F. The welding of this steel.
(J general, K9, Q general, AY)

182-J. Annealing Instrument Cases. K. I. Robinson. *Industrial Gas,* v. 30, June 1952, p. 6-7, 22-23.

Furnace in operation at C. B. Kaupp & Sons can be used for annealing Al, brass and Cu, Monel, Inconel, and stainless steels.
(J23, Al, Cu, Ni, SS)

183-J. New Developments in Rapid Heating for Industrial Processing. Frederic O. Hess. *Industrial Gas,* v. 30, June 1952, p. 9-12, 24.

Some examples of metallurgical interest: surface hardening of steel; short-cycle normalizing of welded steel tubing; and heat treatment of high-strength steel casing.
(J general, ST)

184-J. Heat Treating: Carbon Restoration Furnace Used to Improve Screws, Bolts. *Iron Age,* v. 169, June 19, 1952, p. 171.

Carbon was restored on 0.35% C steel stock depleted to depths of 0.006-0.007 in. (J28, CN)

185-J. Production Problems. XVI. Quenching of Needle Wire. *Iron & Steel,* v. 25, June 1952, p. 297-298.

A metallurgical investigation to determine the cause of cracking of quenched steel needle wire. Possible causes are quenching, hardness, composition, and flaw factors. Tables and micrographs. (J26, CN)

186-J. A New Gear Production and Heat Treatment Installation. *Machinery* (London), v. 80, June 5, 1952, p. 998-1002.

Installation at Blaw Knox, Ltd., London. (J26, G17)

187-J. Production Heat Treating of Connecting Rods. Herbert Chase. *Materials & Methods,* v. 35, June 1952, p. 100-101.

How high output is maintained by using a continuous furnace, caustic soda quench, and recirculating draw furnace. (J26, ST)

188-J. Forgeability, Machinability and Hardenability of Boron Carburizing Steels. S. L. Widring and Wilson T. Groves. *Metal Progress,* v. 67, June 1952, p. 71-76.

Details of experience of Spicer Mfg. Div., Dana Corp., Toledo, Ohio, in use of modified boron steels for carburized gears and shafts. Data are charted and tabulated.
(J26, F22, G17, AY)

189-J. Martempering and Slack Quenching. *Metal Progress,* v. 67, June 1952, p. 90-91.

Use of molten-salt interrupted quenching of toolsteel parts at Ingersoll-Rand, Phillipsburg, N. J.
(J26, TS)

190-J. Heat Treating, Setting and Shot-Peening of Mechanical Springs. F. P. Zimmerli. *Metal Progress,* v. 67, June 1952, p. 97-106.

Second portion of 1951 William Park Woodside Lecture to Detroit Chapter, ASM. Data for both ferrous and nonferrous alloys. Tables, graphs, and diagrams.
(J general, G23)

191-J. Practical Aspects of Tool and Die Heat Treatment. Edward J. Pavesic. *Metal Treating,* v. 3, May-June 1952, p. 4-7.

See abstract, *Steel Processing,* item 162-J, 1952. (J general, TS)

192-J. This Russian-Built Copy of Caterpillar's D7 Tractor Shows Russ Packs Engineering Punch. *SAE Journal,* v. 60, June 1952, p. 17-21. (Based on "The Stalinetz 80 Tractor—A Sobering Example of Soviet Russia's Engineering Competence," by J. M. Davies.)

See abstract of "Russian Tractors Show Sound Engineering", *Iron Age,* v. 169, June 5, 1952, p. 150-152. (J, E, G)

193-J. Giant Tongs Expedite Turret Handling. *Steel,* v. 130, June 23, 1952, p. 80.

Two pairs of tongs are used, one for lifting turrets after heating for hardening and the second for tempering reheat. Remote control is said to eliminate worker hazard and increase production. (J general, A5)

194-J. Boron Saves the Day. Richard Cheney. *Steelways,* v. 8, May 1952, p. 4-7.

Use of B in improving the hardenability of steel and comparison to Ni and Mo. (J26, AY)

195-J. (German.) **Thermotechnical Research on Flame Hardening.** Georg Wagener. *Gas- und Wasserfach,* v. 93, May 15, 1952, p. 225-228.

Comparative studies of effects of slow and sudden heating on temperature gradients of steel heated in a furnace and by a gas flame. Photographs, graphs, and tables. (J2)

196-J. Fairfield's New Gear Plant. Joseph Geschelin. *Automotive Industries,* v. 107, July 1, 1952, p. 50-53.

Heat-treating facilities include a continuous gas-carburizing furnace of radiant-tube type, and a newly developed cycle-annealing furnace of 2-row, pusher type. (J23, J28, ST)

197-J. A Study of the Annealing Kinetics in Cold Worked Copper. Dwain Bowen, R. R. Eggleston, and R. H. Kropschot. *Journal of Applied Physics,* v. 23, June 1952, p. 630-634.

Resoftening kinetics for cold work in Cu were studied using residual resistance as a measure of degree of recovery. It was found that the resoftening could be represented by a single process of activation energy 28.3 kcal. per mole. The complete annealing kinetics are described by a 4th-order reaction. Graphs.
(J23, Cu)

198-J. Migration of Copper Plating in Box Carburizing. T. W. Ruffle and P. M. H. Chawner. *Metal Treatment and Drop Forging,* v. 19, June 1952, p. 245-250, 254.

Carburizing difficulties that arise near Cu-plated, "stopped-off" zones of steel components. Photographs and photomicrographs. (J28, Cu, ST)

199-J. Heat-Treatment of Steel Gears. *Metal Treatment and Dorp Forging,* v. 19, June 1952, p. 251-254.

New heat treatment shop at the Rochester works of Blaw Knox Ltd., for treatment of steel gears and shafts. (J general, ST)

200-J. (French.) **The Influence of Gas Adsorption on the Surface Hardening of Beryllium Bronze, Annealed After Hardening.** Hubert Forestier and Joseph Maurer. *Comptes Rendus hebdomadaires des Séances de l'Academie des Sciences,* v. 234, May 26, 1952, p. 2196-2198.

Results of experiments. H_2, A, and CO_2 were used as atmospheres. Their adsorption on the surface of the crystal lattice caused a variation in rate of transformation of a non-equilibrium state, corresponding to precipitation in a supersaturated alloy after annealing. (J2, N7, Cu)

201-J. (French.) **Thermal Treatment of Metals; Application of Salt Baths.** *Métallurgie et la Construction mécanique,* v. 84, May 1952, p. 321, 323, 325-326.

Reviews recent progress, as applied to steel. Tables give extensive data concerning salt-bath compositions for different heat treatments and different steels. Heat treatment cycles are also tabulated. (J2, ST)

202-J. (German.) **Influence of Size, Preliminary Treatment, and Hardening Agents on the Hardening of Unalloyed Tool Steels.** Erich Theis. *Archiv für das Eisenhuttenwesen,* v. 23, Mar./Apr. 1952, p. 113-118; disc., p. 118.

Investigated for toolsteels containing 0.6-1.0% C, 0.2-0.6% Mn, and 0.1-0.2% Cr. Influence of the various factors; optimum size and treatment for test pieces. Data are charted. (J26, TS)

203-J. The Annealing and Heat Treatment of Ductile Cast Iron. C. C. Hodgson and W. Fairhurst. *Metallurgia,* v. 45, June 1952, p. 283-288, 296.

Investigation undertaken to determine the relationship between thermal treatments applied to ductile cast iron and its structure and mechanical properties. The treatments comprise annealing to improve machinability or develop maximum ductility and toughness, hardening, and tempering. Effects of Mn and Si content. Photomicrographs, diagrams, and tables.
(J general, Q general, G17, CI)

204-J. A Modern Heat Treatment Plant: Wild-Barfield Installations at Blaw-Knox, Ltd. *Metallurgia,* v. 45, June 1952, p. 297-298.

Facilities and operations at above British plant. A variety of case hardening steels are treated.
(J general, CN, AY)

205-J. Residual Stresses in Springs. O. B. Meyers. *Product Engineering,* v. 23, July 1952, p. 148-149.

Control by stress-relief and cold setting, with some information for a variety of spring metals and types. Diagrams and graph. (J1, Q25, SG-b)

206-J. Direct Resistance Heating. Lewis B. Reed. *Steel,* v. 131, July 14, 1952, p. 86-87.

Examples of use are annealing Cu tubing and spring steel strip, and upsetting of steel rod.
(J2, J23, F21, Cu, ST)

207-J. High Chromium Stainless as a Substitute for 18-9. Part I. Heat Treating, Forging, Pressworking. Lester F. Spencer. *Steel Processing,* v. 38, June 1952, p. 288-294, 298.

Type 430 stainless steel, its chemical composition and typical physical and mechanical properties as compared with Type 302. Procedure for heat treating, forging, and pressworking of Type 430. Includes pickling and scale removal. Tables, photomicrographs. (To be continued.)
(J general, F22, G1, SS)

K

JOINING

541-K. Ore Bridge Span Uses Arc Welding for the First Time. H. E. Cable. *Iron and Steel Engineer,* v. 29, June 1952, p. 116, 118, 120.

Span fabricated by Dominion Foundries and Steel Co., Ltd., Hamilton, Ontario. (K1, T26, CN)

542-K. Strength of Bolted Assemblies. John S. Davey. *Machine Design,* v. 24, June 1952, p. 248, 250, 252, 254, 256, 258, 260.

See abstract from *Tool Engineer;* item 511-K, 1952. (K13, Q23)

543-K. The Welding of High-Pressure Pipes. *Metal Progress,* v. 61, Apr. 1952, p. 154, 156. (Translated and condensed from "Welding Problems With High-Pressure Pipe Lines", H. Hauttmann, *Berg- und Hüttenmännischen Monatshefte,* v. 95, Dec. 1950, p. 314-317.)

Boiler plate originally used for the pipeline was susceptible to brittle fracture. As a result of weld-bending tests, an "Aldur" steel was developed which prevents this type of cracks. (K9, ST)

544-K. Flow of Liquid Metals on Solid Metal Surfaces. *Metal Progress,* v. 67, June 1952, p. 144, 146, 148. Condensed from "The Flow of Liquid Metals on Solid Metal Surfaces and Its Relation to Soldering, Brazing, and Hot-Dip Coatings", G.L.J. Bailey and H. C. Watkins.)

Previously abstracted from *Journal of the Institute of Metals.* See item 626-K, 1951.

(K7, K8, L16, Pb, Fe, Cu, Sn, SG-f)

545-K. Effect of Temperatures From −70° to 600° F on Strength of Adhesive-Bonded Lap Shear Specimens of Clad 24S-T3 Aluminum Alloy and of Cotton- and Glass-Fabric Plastic Laminates. H. W. Eickner, W. Z. Olson, and R. F. Blomquist. *National Advisory Committee for Aeronautics,* Technical Note 2717, June 1952, 26 pages.

Performance of 14 commercial adhesives under above conditions was evaluated, also that of seven commercial adhesives at −70 to 250° F., in lap joints of cotton-fabric-phenolic laminate to itself, of glass-fabric-polyester laminate to itself, and in joints of each of these laminates to clad Al. Experimental set-up diagrammed; data tabulated.

(K11, Al)

546-K. Welding Tantalum. Adrian H. Daane. *Review of Scientific Instruments,* v. 23, May 1952, p. 245-246.

Electrodes made of several materials were tested, including W, Ta, and graphite. Graphite gave the most stable and controllable arc. Diagrams. (K1, Ta, W)

547-K. Nodular Cast Iron Welds Hard to Machine. E. F. Davis and E. L. Layland. *Steel,* v. 130, June 23, 1952, p. 78-79.

Study shows that electric arc welds of one type of nodular cast iron approach the strength of the parent metal, but lack ductility, and are extremely hard to machine. Effects of preheating and post annealing on mechanical properties and soundness of such welds joining nodular iron to itself, and to mild steel with two types of electrodes. Extensive tables.

(K1, G17, CI, CN)

548-K. Effect of Taper on Screw-Thread Load Distribution. E. E. Stoeckly and H. J. Macke. *Transactions of the American Society of Mechanical Engineers,* v. 74, Jan. 1952, p. 103-112.

Load distribution on the threads of bolts and nuts, made in the conventional constant-pitch manner and with tapered threads, was determined experimentally and theoretically. Results indicate that substantial improvement in thread-load distribution can be made by tapering the thread of either the bolt or nut. Material improvement in bolting strength is otbained in applications normally conducive to little plastic flow and thus liable to brittle fractures, with dynamic loads or static loads at elevated temperatures. Operational experiences. (K13, Q23)

549-K. Steel Mill Maintenance Welding During a Defense Period. R. L. Deily. *Welding Journal,* v. 31, June 1952, v. 476-478.

Organization and planning of steelmill maintenance with a typical application.

(K general, D general, CN)

550-K. Characteristics of Submerged Arc Welding With Three-Phase Power. E. A. Clapp and N. G. Schreiner. *Welding Journal,* v. 31, June 1952, p. 479-485.

Submerged-melt welding operating with 3-phase welding power applied to two welding rods arranged in close tandem so as to deposit weld metal into a common welding pool offers many advantages in some applications over other methods of submerged-arc welding. Data on typical welds in steel plate.

(K1, CN)

551-K. Oxyacetylene Welding and Cutting as Applied to Railroads. W. D. Waldron. *Welding Journal,* v. 31, June 1952, p. 486-491.

Repair and fabrication of parts for passenger and freight cars and of steam and diesel locomotives.

(K2, G22, ST)

552-K. Hydrogen in Mild-Steel Weld Metal. A. L. Schaeffler, H. C. Campbell, and H. Thielsch. *Welding Journal,* v. 31, June 1952, p. 283s-309s.

Reviews of published and unpublished information on occurrence and effects of H_2 in mild steel weld deposits made by shielded-metal-arc welding with covered electrodes; H_2 in commercial electrodes; effects of H_2 on porosity, cracking, fisheyes, and mechanical properties; welding considerations; practical applications, and engineering recommendations. Tables, graphs, diagrams, and macrographs. 183 ref. (K1, K9, CN)

553-K. Brazing Hydromechanics. E. R. Funk and H. Udin. *Welding Journal,* v. 31, June 1952, p. 310s-316s.

Factors affecting rate of completion of a brazed joint are related to physical constants of the brazed metal, its surface tension, and joint dimensions. A study is presented of flow through two types of capillary dams. These considerations are modified to include the more practical case of fluxed joints. Effects on design for brazing. (K8)

554-K. The Suitability of Various Steels for Flash Welding. Erich Hormann. *Welding Journal,* v. 31, June 1952, p. 318s-320s. (Translated and condensed.)

Previously abstracted from *Stahl und Eisen.* See item 228-K, 1952.

(K3, K1, Q general, AY, SS)

555-K. (German) **Double Spot Welding for Light Metal Construction.** K. Ruppin. *Metall,* v. 6, June 1952, p. 308-309.

A specialized welding machine. Structural details and advantages.

(K3, Al)

556-K. (Russian.) **Automatic Argon-Arc Welding With Mechanical Feed of the Wire Electrode.** A. Ia. Brodskii. *Avtogennoe Delo,* v. 23, Apr. 1952, p. 8-11.

Equipment and its use with 18-9 stainless-steel wire. (K1, SS)

557-K. (Russian.) **Influence of Certain Structural Factors on the Operation of Injection Welding Torches.** V. D. Nechaev. *Avtogennoe Delo,* v. 23, Apr. 1952, p. 11-15.

Detailed discussion. Data are tabulated. (K2)

558-K. (Russian.) **Automatic Welding and Gas Cutting in Mass Production of Tractors.** E. A. Levchenko. *Avtogennoe Delo,* v. 23, Apr. 1952, p. 25-28.

Equipment and procedures.

(K2, G22, CN)

559-K. Nondestructive Determination of Mechanical Properties and Deterioration of Adhesives. Albert G. H. Dietz, Herman N. Bockstruck, and George Epstein. *American Society for Testing Materials,* Preprint 134, 1952, 14 pages.

Experimental work done at MIT for U. S. Army Ordnance. Emphasis is on nonbiological factors leading to deterioration of such adhesives, particularly in metal-to-metal bonds. Two types of adhesives were tested in joining of Al alloy and stainless steel rods. Apparatus and results, charted and tabulated. (K12)

560-K. Welding Magnesium by the Aircomatic Process. Harold Robinson. *Canadian Metals,* v. 15, June 1952, p. 48, 50.

Essentially an inert gas-shielded metal-arc process consisting of a continuously fed, consumable, bare electrode wire. The shielding gas, A or He, is fed through a hand gun simultaneously with the wire, forming an envelope of protective gas around the arc and welding area, eliminating the necessity of flux and the formation of slag. Data on the process for welding Mg.

(K1, Mg)

561-K. Connections for Aluminum Conductors. *Electrical Manufacturing,* v. 50, July 1952, p. 226, 228, 230, 232.

Report on an NEMA meeting concerning technical problems in terminating Al conductors to electrical equipment. (K13, T1, Al)

562-K. Seventeen Cr Stainless Replaces 18-8 in Many Weldments. *Iron Age,* G. E. Linnert, v. 169, June 26, 1952, p. 97-100; v. 170, July 3, 1952, p. 128-132.

Part I: Steels with 17% Cr properly handled show as good corrosion resistance as 18-8 in welded parts. Ferrite grain growth and martensite will reduce joint properties if allowed to form but both can be controlled. The Ti-stabilized 17% grade is easier to control when the right welding practice is used. Both 430 and 430-Ti show less distortion in welding than 18-8. Part II: Gas-torch welding should not be used on Types 430 or 430T grades as grain growth or carbon pickup may occur. Shielded welding prevents loss of Ti on 430T. When using 430, preheating electrodes minimizes the pinhole conditions sometimes encountered. When spot welding cross-wire joints a mutual indention of 20-30% of the wire diameter is used and proper current from 1-10 cycles is then selected. Tables and photomicrographs.

(K general, Q general, R general, SS)

563-K. Triple Multi-Point Welding Machine for Automobile Seats. R. M. Herbert. *Machinery* (London), v. 80, June 19, 1952, p. 1079-1080.

Machine and its operation at Philips Electrical, Ltd. The machine is a 3-station, automatic resistance welding type, with electronic controls. (K3)

564-K. Composite Forgings Cut Tooling Costs. *Overseas Engineer,* v. 25, July 1952, p. 426-427.

System of composite forgings consists of flash-butt welding a section of toolsteel to a mild steel base, both of which have been previously flame-cut to the required shape. Sections can be manufactured up to 36 in. long by 12 in. wide by 10 in. high, with a maximum weld area of 80 sq. in. (K3, CN, TS)

565-K. 1952 Product and Statistical Review Number. *Welding Engineer,* v. 37, mid-June 1952, 156 pages.

Statistical review of the welding industry in 1951; product and literature review; product classification list; and trade name index.

(K general, A4, A10)

566-K. Modern Methods for Copper Brazing. Fred M. Burt. *Welding Engineer,* v. 37, July 1952, p. 30-34.

Materials, advantages, sizes and shapes, limitations, and economies of production furnace brazing as practiced at Fabriform Metal Products, Inc., Los Angeles. Low-carbon steels, irons, and many alloy steels can be brazed. Includes data on joint strength.

(K8, Q23, Cu, CN, Fe, AY)

567-K. Joins Heavy Aluminum. *Welding Engineer,* v. 37, July 1952, p. 35.

Spot welding operations at Republic Aviation Corp., Long Island, N. Y. A new large spot-welding machine can join high-strength Al alloys in combinations of thickness up to ¼-⅜ in. (K3, Al)

568-K. Spot and Seam Welding at Northrop Aircraft. Thomas A. Dickinson. *Welding Engineer*, v. 37, July 1952, p. 40-42, 62.

Procedures. Equipment includes a spot-seam welder capable of welding two 24ST or 75ST Al sheets of ⅛ in. maximum thickness to each other. Quality-control program. (K3, S12, Al)

569-K. When to Design for Cast-Welded Construction. Robert J. Franck. *Welding Engineer*, v. 37, July 1952, p. 43.

The production of drive-spacer housings by Superior Steel and Malleable Castings Co., Benton Harbor, Mich. (K general, E general, ST)

570-K. Torch Maintenance for Diesels. W. D. Waldron. *Welding Engineer*, v. 37, July 1952, p. 44-46, 66.

See abstract of "Oxyacetylene Welding and Cutting as Applied to Railroads", *Welding Journal*, item 551-K, 1952. (K2, G22, ST)

571-K. (German.) **Welding Aluminum Parts in Chemical-Apparatus Construction.** A. Müller-Busse. *Chemie-Ingenieur-Technik*, v. 24, May 1952, p. 288-293.

Various methods of welding Al and the promising prospects of inert-gas shielded welding. Graphs, diagrams, and photographs. 12 ref. (K1, Al)

572-K. (German.) **Joining of Metals to Each Other or to Other Materials.** K. Meyerhans. *Metall*, v. 6, May 1952, p. 229-240.

Reviews the possibilities of joining metals by means of organic binding agents, particularly pressure-setting agents. Examples of the use of such plastics for various tasks in industry. Their advantages, and properties of the bonds. Tables, diagrams, and photographs. (K12)

573-K. (German.) **Present-Day Steel Bridge Construction, With Emphasis on Welding.** K. Lange. *Schweissen und Schneiden*, v. 4, June 1952, p. 173-182.

Modern developments, especially with respect to railway bridges. Manual and automatic welding. Numerous diagrams. (K1, T26, CN)

574-K. (German.) **Construction of a Milk-Drying Tower of Pure Aluminum With the Help of Four-Plate Weldments.** R. Pfeiffer. *Schweissen und Schneiden*, v. 4, June 1952, p. 182-187.

Special problems presented. Welding experiments and the final method of construction. Photographs and diagrams. (K1, Al)

575-K. (German.) **Influence of Welding Technology on the Construction of Building Elements in Ship Construction.** H. Dohrmann. *Schweissen und Schneiden*, v. 4, June 1952, p. 187-194.

Slow acceptance of welded structures in ship construction. The quality of riveted and welded elements is compared; the value of welded structural elements for the safety of the ship. Diagrams and photographs. (K general, T22, CN)

576-K. (German.) **Electric Multispot Welding.** H. W. Roth. *Schweissen und Schneiden*, v. 4, June 1952, p. 194-198.

Various types of modern equipment, particularly the multispot process with secondary current reversal. (K3)

577-K. (German.) **Application of Welding Technique to Machinery and Equipment for Mining.** K. L. Zeyen. *Schweissen und Schneiden*, v. 4, June 1952, p. 211-215.

Welding electrodes for manual arc welding, and application of this technique to mining equipment. Tables, macrographs, and photographs. (K1)

578-K. (German.) **Experiments on the Cold Pressure Welding of Metals.** Wilhelm Hofmann and Jürgen Ruge. *Zeitschrift für Metallkunde*, v. 43, May 1952, p. 133-137.

Dependence of tensile strength of the welds upon the materials welded, degree of deformation, and welding temperature. Application of the method to butt welds. Tables, charts, and micrographs. (K5)

579-K. (German.) **Fluxing Agents for Soft Soldering.** C. G. Keel and G. B. Brubacher. *Zeitschrift für Schweisstechnik, Journal de la Soudure*, v. 42, May 1952, p. 95-101.

Reviews recent patent literature concerning the more important fluxing agents developed up to 1950. Table gives chemical composition, properties, applications, and references (mostly patents), for 37 different types. (K7)

580-K. (Swedish.) **Step Welding of Toolsteels and of Certain Hardening and Tempering Structural Alloy Steels.** Tore Norén. *Jernkontorets Annaler*, v. 136, No. 4, 1952, p. 74-89.

By the aid of TTT-diagrams for steels of high hardenability, it was found possible to calculate suitable welding conditions leading to decreased cracking tendency and to advantages from the point of view of heat treating. These principles were applied in developing the step welding method, in which welding takes place after austenitizing the base material followed by quenching to a temperature, generally about 500° C., where transformation velocity is so low that the steel remains austenitic during welding. The steel is afterwards cooled and tempered, and heat treatment is adjusted to properties of the base material and the weld. Step welding may be applied to hard surfacing in general and also to the welding of slowly transforming structural steels. Graphs, table, micrographs, and photographs. (K9, N8, AY)

581-K. Metal Bonding: Developments in the Redux Process; Application of the Vacuum Technique. G. S. Newell. *Aircraft Production*, v. 14, July 1952, p. 220-223.

17 references. (K12)

582-K. Multistory Welding. *Architectural Forum*, v. 96, June 1952, p. 155.

New arc-welding technique which reduces shrinkage and simplifies plumbing the steel frame. (K1, T26, CN)

583-K. Plastic Patching for Steel Piping. Thomas W. McConville. *Bureau of Ships Journal*, v. 1, June 1952, p. 15-17.

Navy foresees many uses in making emergency repairs of battle damage. A ruptured water main was repaired in approximately 30 min., and the patch was strong enough to withstand a pressure of 300 lb. (K11)

584-K. Wanted: Information on Aluminum Connections. J. P. Hayward. *Electrical World*, v. 138, July 14, 1952, p. 137-138.

Need for economical splicing method that will last as long as the conductors—and still maintain high electrical conductivity when exposed to salt spray and industrial atmospheres. (K13, T1, R3, Al)

585-K. The What, Why, and How of Connections for Aluminum. M. D. Bergan. *Electrical World*, v. 138, July 14, 1952, p. 139-142.

Merits and demerits of various types. (K general, T1, Al)

586-K. Butadiene-Methacrylic Acid Copolymers as Rubber-to-Steel Adhesives. Charles E. Fran, Gerad Kraus, and Albert J. Haefner. *Industrial and Engineering Chemistry*, v. 44, July 1952, p. 1600-1603.

Preparation and properties. 16 ref. (K11, ST)

587-K. Welding Aids Expansion at General Mills. *Industry & Welding*, v. 25, July 1952, p. 31-32.

Miscellaneous equipment and procedures. (K general)

588-K. Here's How Welding Helps "Made to Order" Production. Howard E. Jackson. *Industry & Welding*, v. 25, July 1952, p. 34-36, 81.

Welding applications used in manufacture of heavy-duty custom-built buses and trucks by Kenworth Motor Truck Corp., Seattle. Various processes and materials. (K general, T21)

589-K. Arc Cutting and Brazing Save $1305 in Repair of Cast Housing. *Industry & Welding*, v. 25, July 1952, p. 38.

(K8, G22, CI)

590-K. World's Largest Welded Spans Feature 50 Percent Weight Saving. A. F. Davis. *Industry & Welding*, v. 25, July 1952, p. 42-45.

Weight saving was possible through welded construction and a special type of beam section in new municipal auditorium in Mexico City. Illustrated. (K1, T26, CN)

591-K. Welded Air Tunnel. *Industry & Welding*, v. 25, July 1952, p. 58-59.

Construction and operating details of the fastest of three giant wind tunnels for studying supersonic flight, at NACA. Joining of forged steel disks and forged steel shaft ends. (K general, ST)

592-K. Special Fixtures Speed Sheet-metal Fabrication. G. C. Farrington. *Iron Age*, v. 170, July 10, 1952, p. 142-144.

Fixtures used in projection welding in manufacture of home-laundry equipment. (K3, ST)

593-K. Jet Engines Push Welded Molybdenum Study. Willard M. Boam. *Iron Age*, v. 170, July 10, 1952, p. 145-148.

Weldability of Mo and some Mo-W, Mo-V, Mo-Ti, and Mo-Cb alloys. Effects of He-shielded tungsten electrodes on proper welding conditions, on the problem of securing ductile welds, and on effects of welding on mechanical properties. Photomicrographs and photographs. (K1, Q general, Mo)

594-K. Aluminum Welding *Product Engineering*, v. 23, July 1952, p. 254, 256, 258, 260. (Condensed from "Good Aluminum Welding Starts With the Engineer", by R. M. Curran.)

Previously abstracted from *General Electric Review*. See item 384-K, 1952. (K general, Al)

595-K. A Survey of Modern Theory on Welding and Weldability. (Continued.) D. Séférian. *Sheet Metal Industries*, v. 29, July 1952, p. 627-634, 642.

Influence of type of electrode coating on mechanical properties of the weld metal, and related aspects including microstructure; influence of hydrogen on weld seams and in relation to various faults; and the Fe-H equilibrium. Tables, graphs, and photomicrographs. 12 ref. (To be continued.) (K9, Q general, M27, Fe)

596-K. Automatic Flash Butt Welding in Shipyards. *Sheet Metal Industries*, v. 29, July 1952, p. 641.

A demonstration by a new machine made by the English firm, A. I. Electric Welding Machines, Ltd. (K3)

597-K. Titanium Alloys Flash Welded Easily. I. A. Oehler. *Steel*, v. 131, July 14, 1952, p. 84-85.

Satisfactory welds can be produced on conventional hydraulic machines if material is of uniform structure and if welded parts are annealed immediately after welding. (K3, Ti)

598-K. Automatic Welding Devices Speed Cradle Production at Pacific Car. Howard E. Jackson. *Western*

Metals, v. 10, June 1952, p. 48-50.

Mass-production welding of structural steel, 800-lb., pot-supporting cradles at Pacific Car & Foundry Co., Wenatchee, Wash., (K1, CN)

599-K. (Book) **Design Manual for the Repair of Aluminum Alloy Structures.** Howard M. Jensen. 208 pages. 1952. Johnson Research Corp. $3.50.

Almost every repair that might be required on an Al alloy structure is covered. Each repair has been accurately designed and stress analyzed. (K general, T26, Al)

600-K. (Book) **Gas Welding of Aluminium.** 68 pages. Aluminium Development Association, 33 Grosvenor St., London W. 1, England. (Information Bulletin No. 5, Revised.) 2s.

Modifications to fusion welding procedures that result from the characteristics of aluminum. Various gas welding processes—fuel gases; flame types; equipment; fluxes, and filler metal. Welding procedure—preparation of parent metal, techniques for horizontal and vertical welding, and post-welding treatment. Short notes on atomic hydrogen welding and other processes. Inspection of welds, properties of gas welds, and data for estimating costs. Appendixes give the specified composition of Al welding wire and a table of aircraft specification numbers. (K2, Al)

601-K. (Book) **Modern Welding Practice. Ed. 2.** Andrew D. Althouse, Carl H. Turnquist, George E. Tabraham, and Burl E. Ott. 498 pages. 1951. Goodheart-Willcox Co., Chicago.

Nontechnical description of all types of gas and electric welding, heat treating, and metal cutting including submerged-arc and inert-gas welding, arc-oxygen cutting, underwater cutting and welding, stud welding, sprayed hard surfacing, welding tool and die steels, and power and flux cutting of high-alloy steels.
(K general, G22, J2, L24)

602-K. (Book) **Welding Practice. Vol. 3. Welding of Non-Ferrous Metals.** E. Fuchs and H. Bradley, editors. 183 pages. Butterworths Scientific Publications, 4-6 Bell Yard, Temple Bar, London W.C. 2, England. 22s., 6d.

General arrangement follows that of the previous volumes. Broad advice on procedure, technique, process and design is of value to the industry, designer, works foreman, instructor welder, and student alike. Bibliography at the end of each chapter. (K general, EG-a)

L

CLEANING, COATING AND FINISHING

611-L. Recommendations Affecting Standards Relating to Electrodeposited Metallic Coatings. *American Society for Testing Materials, Proceedings*, v. 51, 1951, p. 202-203.

Previously abstracted from Preprint 13; item 439-L, 1951.
(L17, Zn, Al, S)

612-L. Aspects of "Brightening" in Silver Baths. H. E. Arblaster. *Australasian Engineer*, Apr. 7, 1952, p. 73-75.

Nature of the 'bright' silver deposit; probable chemical compounds formed in cyanide plating baths; and electrolysis of NaCN plating solutions. 12 ref. (L17, Ag)

613-L. Porcelain Metals Celebrates Its 25th Anniversary. *Better Enameling*, v. 23, June 1952, p. 8-14.

Historical development of the Porcelain Metals Corp., Louisville, Ky. The metal shop, and enamel-processing department. (L27, A5, ST)

614-L. The Anodic Oxidation of Aluminium. G. C. Thompson. *Electronic Engineering*, v. 24, June 1952, p. 281-283.

Relative merits of different processes for the above. Theory.
(L19, Al)

615-L. Metal Spraying in Industry. G. A. Onion. *Electroplating and Metal Finishing*, v. 5, Feb. 1952, p. 69-70; Apr. 1952, p. 137-138.

Previously abstracted from *Transactions of the Institute of Welding;* see item 606-L, 1952. (L23)

616-L. Plating Powder Metal Compacts. *Electroplating and Metal Finishing*, v. 5, June 1952, p. 201.

Plating before sintering and the avoidance of cyanide electrolytes are recommended. An example of Ni plating of iron. (L17, Ni, Fe)

617-L. Metal Spraying as a Marking Process. *Electroplating and Metal Finishing*, v. 5, June 1952, p. 207, 209. (Condensed from *Product Finishing*, Dec. 1951.)

A number of applications of metal spraying, chiefly for electrical manufacturing purposes. Variety of metals used in spraying. (L23)

618-L. Transfer of Wood Grain to Sheet Metal. Howard T. Davis. *Industrial Finishing*, v. 28, June 1952, p. 26-31, 33.

Process at Parker-Wolverine Div., Udylite Corp. Metal preparation and the transfer process involving coating, color printing, and baking operations. (L26)

619-L. Baked Clear Coat Protects Chrome-Plated Auto Parts. P. C. Bardin. *Industrial Finishing*, v. 28, June 1952, p. 44-46, 48, 50.

Set-up includes a 4-stage cleaning operation, drying oven, electrostatic spraying to put on a clear synthetic coat, and oven baking, with an effective automatic control system. (L26, Cr)

620-L. Production Finishing of Electrical Equipment. Bruce Robert. *Industrial Finishing*, v. 28, June 1952, p. 70-72, 74.

At Emerson Electric Mfg. Co. Chief example is the application of black wrinkle enamel on electric fans. (L26)

621-L. Glazing Bread Pans With Gas. William Helme. *Industrial Gas*, v. 30, June 1952, p. 3-5, 23.

The Glazon process, in which a specially formulated resin coating is applied to bread pans to prevent contents from sticking. (L26)

622-L. Plates and Sections: Phosphating Treatment at Appleby-Frodingham. *Iron & Steel*, v. 25, June 1952, p. 282.

The Footner process, providing steel which has been pickled, phosphated, and primed. (L14, ST)

623-L. Shot Blasting Speeds Stainless Strip Cleaning. J. B. Delaney. *Iron Age*, v. 169, June 19, 1952, p. 133-135.

Costs were drastically cut at the West Leechburg plant of Allegheny Ludlum Steel Corp. with installation of a Wheelabrator shot-blasting unit in the strip-pickling line. Chief cost saving is elimination of scale-breaking on straight chrome grades. (L10, SS)

624-L. A Non-Electrolytic Smoothing Treatment for Steel. W. A. Marshall. *Journal of the Electrodepositors' Technical Society*, v. 28, 1952, p. 27-46. (Preprint.)

It was found that aqueous solutions containing $H_2C_2O_4$, H_2O_2, and H_2SO_4 exert a pronounced smoothing action on ferrous alloys, producing, with mild steel and whiteheart malleable cast iron, a considerable degree of polish. Very strong adhesion of electrodeposited Ni to treated steel has been obtained, typical values being of the order of 50 tons per sq. in.
(L12, CN, CI, Ni)

625-L. The Physical and Chemical Changes Which Accompany the Polishing of Metals. A. J. W. Moore. *Journal of the Electrodepositors' Technical Society*, v. 28, 1952, 8 pages. (Advance Copy No. 1)

Area of contact; temperature of sliding; surface damage; theory of friction; properties of polished metal; mechanism of polishing; role of the abrasive; and structure of deformed layers. Micrographs. (L10)

626-L. An Electron-Diffraction Investigation of the Structure of Electrodeposited Coatings on Iron Single Crystals. D. J. Evans and M. R. Hopkins. *Journal of the Electrodepositors' Technical Society*, v. 28, 1952, 10 pages. (Advance Copy No. 8)

Experimental procedure and results obtained in deposition of Zn, Cu, and Ni on Fe single crystals.
(L17, M27, Fe, Zn, Cu, Ni)

627-L. Zinc Dust as a Protective Pigment. A. Pass. *Journal of the Oil & Colour Chemists' Association*, v. 35, June 1952, p. 241-261.

Methods of preparation and physical, chemical and pigmentary properties of zinc dust. Reviews various paint formulations in which the pigment is used, including cementiferous paints based on inorganic binders. Theoretical considerations underlying the anticorrosive properties of Zn dust paints; different considerations applying to marine and atmospheric exposures. 16 ref. (L26, Zn, ST)

628-L. The Use of Aluminium Contacts in Electro-Polishing. H. J. Hartley. *Journal of Scientific Instruments*, v. 29, June 1952, p. 204.

Method using an insulating film of colloidal Al hydroxide on pure Al wire for establishing electrical contact without current leakage through the solution. (L13, Al)

629-L. Stainless-Clad Copper Promises Improved High-Temperature Service. *Machine Design*, v. 24, June 1952, p. 141-142.

"Sandwiching" of Cu and steel for highest thermal conductivity of a heat resisting material. Two outstanding benefits are the saving in weight and critical materials. An important application is in jet-aircraft engines.
(L24, T24, SS, Cu, SG-h)

630-L. Electroplated Coatings on the Light Metals. Philip O'Keefe. *Materials & Methods*, v. 35, June 1952, p. 119-130.

The metals discussed are Al, Mg, and Ti. Surface preparation for plating; plating processes; properties of the electrodeposits; and applications of plated Al and Mg.
(L17, Al, Mg, Ti)

631-L. Production Plating of Aluminium. A. W. Wallbank. *Metal Industry*, v. 80, May 30, 1952, p. 442-443; disc., p. 443-444. (A condensation.)

Recommended procedures. Composition and operating conditions of cleaning and plating solutions are tabulated. Metals plated are Zn, brass, and Ni. (L17, Al, Zn, Cu, Ni)

632-L. Finishing Metal Parts for Telephones. F. B. Rinck. *Metal Progress*, v. 67, June 1952, p. 65-70.

Plating and inorganic finishing of a wide variety of parts using 16 types of inorganic finishes and many kinds of organic systems. Automatic equipment is used for Zn, Ni, Cu-Ni, Au, Ag, and Cu-Sn. Barrel-plating sections, cleaning, degreasing, passivation, etc. Main base metals are brass, steel, and Al.
(L general, Cu, ST, Al)

633-L. Hard Chromium Plate and Bright Plating of Steel or Die Cast-

ings. Allen G. Gray. *Metal Progress,* v. 67, June 1952, p. 77-78, 170, 172.

Reviews recent work, including the self-regulating Cr-plating bath, properties of Cr plate, decorative uses, and Cr-plated die castings. (L17, Cr)

634-L. An Improved Cell for Electrolytic Polishing. L. W. Gleekman, G. E. Evans, and C. S. Grove, Jr. *Metal Progress,* v. 67, June 1952, p. 92-93.

Made from lucite tubing, closed with polystyrene plugs. Useful for acid electrolytes other than perchloric. In polishing of 14-carat gold, tests were run to determine effect on microstructure of such variables as electrolyte composition, cell voltage and current, previous mechanical polish, cathode-anode distance, rate of agitation, time of current flow, and cathode material. (L13, Au)

635-L. Improved Finish for Magnesium Alloys. *Metal Progress,* v. 67, June 1952, p. 166. (Condensed from "A New Finish for Magnesium Alloys", Harry A. Evangelides.)

Previously abstracted from *Metal Finishing.* See item 720-L, 1951. (L13, R general, Mg)

636-L. Plating Aluminum With Nickel. *Metal Progress,* v. 67, June 1952, p. 168. (Condensed from article by A. G. Thomson, *Metallurgia,* v. 44, Dec. 1951, p. 308.)

Directions for modified etching and plating solutions and procedures developed in the laboratory. Applications. (L17, Al, Ni)

637-L. Outlook for Tin Conservation. R. R. Hartwell. *Modern Packaging,* v. 25, June 1952, p. 136-139, 182, 185.

Directions of approach and technical limitations of further reductions in coatings. Experimental procedures. Tabular and graphical data on performance of different types and thicknesses of tin coatings on cans used to store various types of food. (L16, T29, Sn, ST)

638-L. Migration of Cobalt During Firing of Ground-Coat Enamels on Iron. William N. Harrison, Joseph C. Richmond, Joseph W. Pitts, and Stanley G. Benner. *National Advisory Committee for Aeronautics,* Technical Note 2695, June 1952, 28 pages.

See similar abstract from *Journal of American Ceramic Society;* item 501-L, 1952. (L27, Fe)

639-L. The Utilization of Norelac Resins in Protective Coatings. A. J. Lewis, L. B. Falkenburg, and J. C. Cowan. *Paint, Oil & Chemical Review,* v. 115, June 19, 1952, p. 13-14, 17.

Results of studies on durability tests made to determine the suitability of Norelac as a wood sealer, corrosion-resistant coating, and as a finish coating on wood and steel. Extensive tables. (L26, ST)

640-L. Vinyl Coatings Protect Marine Installations From the Ravages of Corrosion. H. E. Waldrip. *Oil and Gas Journal,* v. 51, June 16, 1952, p. 291-292, 295-296, 298-300, 303-304, 306, 309-310.

Variables in formulation of vinyl coatings; need for evaluation; proper surface preparation; and constant supervision and inspection during application on marine equipment used in the search for and production of oil. 11 ref. (L26, ST)

641-L. Bicycle Finishing in Japan. Ezra A. Blount. *Products Finishing,* v. 16, June 1952, p. 88-98.

The plant whose finishing operations are described employs a Ransburg electrostatic paint-spray unit, and uses a surface-conversion dip to produce bright zinc plate. (L16, L26, Zn, ST)

642-L. Giant Construction Equipment Gnome Size. Frank L. Bonem. *Products Finishing,* v. 16, June 1952, p. 104-110.

Equipment and procedures for production of toys at Doepke Mfg. Co., Rossmoyne, Ohio. Principal raw materials are sheet steel and aluminum. Emphasis is on finishing procedures — degreasing and spray painting. (L general, Al, ST)

643-L. Spotlighting Finishing Progress. Allen G. Gray. *Products Finishing,* v. 16, June 1952, p. 114, 116, 118, 120, 122, 124.

Reviews recent work on current distribution in Cr plating and on methods for measurement of thickness of organic coatings. (L17, S14, Cr)

644-L. Corrosion. 5. The Protective Action of Paints. J. E. O. Mayne. *Research,* v. 5, June 1952, p. 278-283.

How paint films inhibit corrosion by virtue of their high electrolytic resistance; the electrochemical theory of corrosion applied to the protective action of paints for iron and steel. 24 ref. (L26, R1, Fe, ST)

645-L. Regular Structure Produced on Aluminium by Electro-Polishing. G. L. Bucknell, G. A. Geach, and N. C. Welsh. *Research,* v. 5, June 1952, p. 289-290.

The furrow-like structures produced on Al. (L13, Al)

646-L. New Aluminum-Plating Process. *Technical News Bulletin* (National Bureau of Standards), v. 36, June 1952, p. 86-87.

See abstract of "A Hydride Bath for the Electrodeposition of Aluminum", Dwight E. Couch and Abner Brenner, *Journal of the Electrochemical Society;* item 592-L, 1952. (L17, Al)

647-L. Electrotinning Copper Wire: A New Process. Part I. The Process. Part II. The Machine. Frederick A. Lowenheim. *Wire and Wire Products,* v. 27, May 1952, p. 464-467, 506-507; June 1952, p. 565-568, 632-633.

Part I: Advantages over hot dipping; types of baths; calculation methods. Details of the potassium stannate bath procedure. Sludge formation, type of deposit, rinsing, drag-out recovery, and ventilation. Part II: Physical elements of a process for the continuous deposition of tin upon a moving copper strand. (L17, Cu, Sn)

648-L. (Czech.) **Electrolytic Zinc Plating of Sheet Iron and Its Protection.** Josef Teindl. *Hutnické Listy,* v. 7, Mar. 1952, p. 132-139.

The replacement of hot galvanizing by electrolytic Zn plating for sheet and strip. Proposes a method of preventing the formation of black spots on the inside of plated cans. Equipment diagrams. 14 ref. (L17, Zn, CN)

649-L. (French.) **Study of Variation of the Oxidation Rate of an Al-Mg Alloy With Orientation of the Crystal Structure.** J. Herenguel and P. Lelong. *Revue de Métallurgie,* v. 49, May 1952, p. 374-378.

See similar abstract from *Comptes Rendus hebdomadaires des Séances de l'académie des Sciences;* item 579-L, 1951. (L19, M26, Al)

650-L. (French.) **New Electropolishing Cell. Applicability to the Polishing of Cast Iron.** André Roos. *Revue de Métallurgie,* v. 49, May 1952, p. 385-389; disc., p. 390.

An electrolyte permitting very fast electropolishing of pearlite cast iron containing 2.61% C, 1.89% Si, 0.044% S, 0.14% P, 0.59% Mn, 0.05% Cr, and 0.21% Mo. The arrangement for electrolysis is diagrammed. Influence of the electrolyte, role of surface tension, and mechanism of polishing. (L13, CI)

651-L. (German.) **Production of Materials Resistant to High Temperatures by Siliconizing of Tungsten and Molybdenum.** Erick Fitzer. *Berg- und Hüttenmännisch Monatshefte der Montanistischen Hochschule in Leoben,* v. 97, May 1952, p. 81-90.

The siliconizing of W and Mo wire and their properties. Production of Mo-Si alloys by means of powder metallurgy. Practical applications. Tables, micrographs, diagrams, and graphs. 21 ref. (L15, H general, Mo, Si, W, SG-h)

652-L. (German.) **The Patent Literature in the Field of Anodic Oxidation of Aluminum.** Max Schenk. *Metalloberfläche,* v. 4, sec. B, Mar. 1952, p. B43-B46; Apr. 1952, p. B59-B61; June 1952, p. B91-B92.

Includes tabular summary covering German, U. S., British, French, and other patents. (L19)

653-L. (German.) **The Influence of Audible Sound and Ultrasonics on Electrochemical Processes. Part III.** Albert Roll. *Metalloberflache,* ser. B, v. 4, June 1952, p. B81-B89.

Electrolytic precipitation of metals by the effect of ultrasonics. Various experimental arrangements for this purpose. Precipitation of Ni, Cu, and Cr from solution. Superior mechanical properties (tensile strength and hardness) are shown to exist. Graphs and micrographs. (L17, C23, Ni, Cu, Cr)

654-L. (German.) **Grinding and Polishing in Chromium Plating.** R. Erdmann. *Metalloberfläche,* ser. B, v. 4, June 1952, p. B89-B91.

Special processes necessary because of the hardness of the chromium layer. Various defects of the layer, and methods for improving the surface. (L10, G18, Cr)

655-L. How to Apply Metal to Glass and Ceramics. Samuel Wein. *American Machinist,* v. 96, July 7, 1952, p. 147-154.

Special report on procedures, equipment, and applications. (L general)

656-L. Report of Committee B-8 on Electrodeposited Metallic Coatings. *American Society for Testing Materials,* Preprint 14, 1952, 6 pages.

Recommendations for revisions in standards. (L17, S22)

657-L. Report of Committee D-12 on Soaps and Other Detergents. *American Society for Testing Materials,* Preprint 41, 1952, 16 pages.

Recommended revisions of specifications, standards, and test methods. Includes surface and interfacial-tension determinations, and tests on metal-cleaning agents. (L12)

658-L. Special Protective Finishes Essential for Farm Tractors. Byron F. Campbell. *Automotive Industries,* v. 107, July 1, 1952, p. 34-36, 76, 78, 80, 82.

Corrosion testing of panels with various coatings, against agricultural chemicals; cleaning; painting; and drying. Layout diagram and photographs. (L general, R8)

659-L. Automatic Finishing for Auto Parts. H. N. Acker. *Canadian Metals,* v. 15, June 1952, p. 46-47.

Finishing operations at Canadian Motor Lamp Co., Ltd., Windsor, Ont. Brass and steel items are Cr-Ni plated; and lamp parts are Cr-Ni plated, black enameled, and given an Al-vapor coating. (L17, Cr, Ni, Al, Cu, ST)

660-L. Effect of Addition Agents on Copper Deposition in a Convection-Free System. R. C. Turner and C. A. Winkler. *Canadian Journal of Chemistry,* v. 30, July 1952, p. 507-514.

Effects of gelatin and chloride ion on deposition in a convection-free system were similar in most respects to those observed when convection currents were present. Gelatin concentrations up to and including 250 mgm. per liter and chloride concentrations of 4 and 45 mgm. per liter had no effect on concentration polarization. 12 ref. (L17, Cu)

661-L. New Plating Process for Aluminum. *Electrical Manufacturing,* v. 50, July 1952, p. 117-118.

Brief account of NBS method using an organic plating bath. Photomicrographs. (L17, Al)

662-L. Testing for Enamel Coating Discontinuities. Stanley C. Orr. *Finish,* v. 9, July 1952, p. 23-26, 63-64.

Various methods, including instrumental procedures. Schematic diagrams. (L27, S15)

663-L. Mechanical Handling Simplifies Parts Finishing. *Iron Age,* v. 170, July 3, 1952, p. 122-124.

Plant practice at Ashtabula Bow Socket Co., Ashtabula, Ohio, stressing mechanical handling in its cleaning and painting jobs. Photographs. (L12, L26, A5)

664-L. Platers Show New Products and Methods to Minimize Shortages. *Iron Age,* v. 170, July 3, 1952, p. 125-127.

Some exhibits and papers presented at the 39th Annual Electroplaters Convention held in Chicago, June 16-19, 1952. Some methods and products discussed are white brass plating, vacuum metallizing of Al, heavy Rh plating and possible plating alternates. (L17)

665-L. Developments in the Al-Fin Process. *Machinery* (London), v. 80, June 12, 1952, p. 1024-1027.

British application of U. S. process for bonding Al and its alloys to cast iron and steel. Al-fin bonded cylinders for air-cooled engines, bimetallic pistons, bimetallic brake drums, testing Al-fin brake drums, Al-alloy steel-backed bearings, bondings as an aid to corrosion resistance, gas-turbine compressor blades, and production of hydraulic manifolds. (L22, Al, CI, ST)

666-L. Radiometric Determination of the Efficiency of Water Displacement From Phosphated Surfaces. Stanley L. Eisler. *Organic Finishing,* v. 13, June 1952, p. 19-21.

Experimental procedure. Results of experiments on ten different water-displacing, rust-preventive compounds on steel panels. One of the compounds which was very good when tested on sand-blasted panels proved inferior when tested with phosphated panels. This demonstrates that it is not possible to extend results from one test condition to the other. (L14, ST)

667-L. Requirements of Clear Finishes for Chrome Plating. Arthur L. Phillips. *Organic Finishing,* v. 13, June 1952, p. 22-23, 27.

A two-coat, clear finish has been developed. Test results indicate that many of the problems of formulating a satisfactory organic automotive coating for Cr plating have been solved. (L26, Cr)

668-L. Glass Fiber Protects Tank Bottoms. Carl G. Danielson. *World Oil,* v. 135, July 1, 1952, p. 226, 230.

Coal tar and plastic are also used in mat to reduce corrosion, avoid replacement, and save steel. (L26, ST)

669-L. (French.) **Oxyacetylene Flame Cleaning. Process for Preparation of Metallic Surfaces Before Painting.** L. Mendel. *Revue de la Soudure; Lastijdschrift,* v. 8, No. 2, 1952, p. 68-79.

Various methods, with emphasis on flame cleaning. Advantages and procedures of this method. 10 ref. (L10)

670-L. (German.) **Interpretation of Etch Patterns in Etching and Chemical Polishing of Aluminium.** A. Politycki and H. Fischer. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 326-330; disc., p. 330.

Pattern caused by etching on aluminum. Reason for noncubic patterns. Micrographs. (L12, Al)

AMERICAN CHEMICAL PAINT COMPANY

AMBLER CHEMICALS ACP PROCESSES PENNA.

Technical Service Data Sheet

Subject: IMPROVING PAINT ADHESION ON STEEL WITH GRANODINE®

INTRODUCTION

"Granodine" is a zinc phosphate coating chemical which improves paint adhesion on steel, iron and zinc surfaces. In the Granodizing process, a non-metallic crystalline coating is formed on the treated metal. This bond holds and protects the paint finish and thus preserves the metal underneath.

Official Dept. of Defense Photograph

An F4U Corsair with the Navy's new aircraft anti-tank rocket, the "RAM". A Grade I zinc phosphate finish (JAN-C-490) protects the entire external surface of this rocket and provides a durable bond for the specification paint finish.

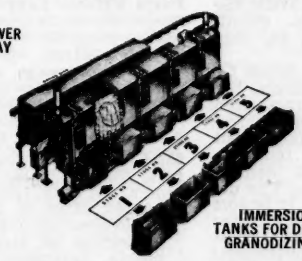
"GRANODINE" MEETS SERVICE SPECIFICATIONS

JAN-C-490, Grade I	CLEANING AND PREPARATION OF FERROUS METAL SURFACES FOR ORGANIC PROTECTIVE COATINGS
JAN-F-495	FINISHES FOR EQUIPMENT HARDWARE
U.S.A. 57-0-2C Type II, Class C	FINISHES, PROTECTIVE, FOR IRON AND STEEL PARTS
U.S.A. 51-70-1, Finish 22.02, Class C	PAINTING AND FINISHING OF FIRE CONTROL INSTRUMENTS; GENERAL SPECIFICATION FOR
MIL-V-3329	VEHICLES, COMBAT, SELF-PROPELLED AND TOWED; GENERAL REQUIREMENTS FOR

GRANODIZING DATA

Granodizing is an easily applied chemical process. Depending on the size, nature and volume of production, Granodizing can be carried out by spraying the parts in successive stages of a power washing machine, by dipping the work in the cleaning, rinsing and coating baths contained in tanks, or by brushing or flow coating the work with portable hand equipment. Typical process sequence and equipment requirements are shown below:

MULTI-STAGE POWER WASHER FOR SPRAY GRANODIZING



PROCESS SEQUENCE
1. Clean
2. Rinse
3. "Granodine"
4. Rinse
5. Final Rinse

IMMERSION TANKS FOR DIP GRANODIZING

NOTE: Equipment can be of mild steel throughout, except in the Granodizing stage, where nozzles, risers, and pump impeller should be of acid-resistant material.

MANY APPLICATIONS

Automobile bodies and sheet metal parts, refrigerators, washing machines, cabinets, etc.; projectiles, rockets, bombs, tanks, trucks, jeeps, containers for small arms, cartridge tanks, 5-gallon gasoline containers, vehicular sheet metal, steel drums and, in general, products constructed of cold-rolled steel in large and continuous production are typical of the many products whose paint finish is protected by "Granodine".

CHEMICALS ACP PROCESSES

WRITE FOR FURTHER INFORMATION ON "GRANODINE" AND YOUR OWN METAL PROTECTION PROBLEMS.

CHEMICALS ACP PROCESSES

671-L. (German.) **Anodic Polishing of Brass and Copper.** Horst Muhlberger. *Zeitschrift für Metallkunde,* v. 43, May 1952, p. 142-146.

Various experimental conditions which affect anodic polishing, particularly importance of the viscous layer, and influence of bath agitation. Optimum plant arrangements and production data. Micrographs, graphs, and diagram. (L19, Cu)

672-L. Economics of Industrial Maintenance Painting. Robert R. Pierce. *Corrosion* (Technical Section), v. 8, May 1952, p. 178-182.

Data are based on results of a continuing research program, initiated by the Corrosion Engineering Products Dept., Pennsylvania Salt Mfg. Co., to determine factors and materials which promote maximum protective life in chemical industrial painting. Determinations were conducted within three major chemical manufacturing plants, widely divergent geographically, in 14 different environments. Wire-brushed, corroded, and blasted surfaces were examined. Tables, graphs, and illustrations. (L26, R11)

673-L. P. R. Plating; an Assessment of the Present Position. *Electroplating and Metal Finishing,* v. 5, July 1952, p. 219-221. (L17)

674-L. Sprayed Metal Coatings for the Protection of Steel Against Corrosion. J. C. Hudson. *Electroplating and Metal Finishing,* v. 5; *Metal Spraying,* v. 2, July 1952, p. 241-245, 247.

Performance of protective sprayed metal coatings in exposure tests, the value of thickness testing for specification purposes, and the painting of sprayed metallic coatings. Tables and graphs. (L23, ST)

675-L. Patent Law in the Metal Finishing Industry. Albert Woodruff Gray. *Metal Finishing,* v. 50, July 1952, p. 46-48.

Various examples of legal actions. (L general, A6)

676-L. A Metal Cleaning Test Using Radioactive Stearic Acid as Oil. J. W. Hensley, H. A. Skinner, and H. R. Suter. *Metal Finishing,* v. 50, July 1952, p. 49-52.

Procedures for producing a uniform, reproducible, abraided surface on steel test pieces, and for applying very thin, uniform, and highly reproducible films of tagged stearic acid to the surface of metal test disks. Special apparatus used in preparation and coating of metal test pieces. Cleaning-test data showing removal from steel of stearic acid soil by single-component alkali solutions, with variation in cleaning time and solution concentration, and by one organic detergent solution, with variation in cleaning time. (To be concluded.) (L12, ST)

677-L. Chromium Plating With the Bornhauser Chrome Solution. Frank Taylor. *Metal Finishing,* v. 50, July 1952, p. 53-56, 64.

Developed primarily for direct Cr plating of Zn-base die-castings, the Bornhauser solution is characterized by the presence of sodium tetrachromate as a principal constituent and is operated at lower temperature and higher current density than the conventional bath. The deposit is dull and gray but it is soft and fairly easily polished to a luster approaching that of normal bright Cr. In comparison with conventional bright Cr-plating solution, throwing power and cathode efficiency are much better and soundness and corrosion resistance are superior. (L17, Cr)

678-L. A Modern, Efficient Plating and Polishing Plant. Fred M. Burt. *Metal Finishing,* v. 50, July 1952, p. 57-63.

Crown City Plating Co., Pasadena, Calif., equipment and procedures. (L17)

679-L. New Aluminum-Plating Process. *Metal Finishing,* v. 50, July 1952, p. 63-64.

See abstract of "A Hydride Bath for the Electrodeposition of Aluminum," Dwight E. Couch and Abner Brenner, *Journal of the Electro Chemical Society;* item 592-L, 1952. (L17, Al)

680-L. Buffing Compounds. H. K. Hunt. *Metal Finishing,* v. 50, July 1952, p. 65-66.

Some physical and chemical properties of the finished material which are common to all buffing compositions, whether they be for buffing metals or nonmetals. Applicabilities to various types of metal. (L10)

681-L. Quantitative Measurement of Adhesion of Electrodeposited Metals. H. C. Schlaupitz and W. D. Robertson. *Plating,* v. 39, July 1952, p. 750-753, 764.

The problem of measuring adhesion; tests proposed and evaluated; technique is demonstrated. Tables and diagrams. (To be continued.) (L17)

682-L. Tentative Recommended Practice for Preparation of Zinc-Base Die Castings for Plating. *Plating,* v. 39, July 1952, p. 759-761.

Recommendations of ASTM tentative standard B252-51T, 1951. (L17, Zn)

683-L. Polarization and Overvoltage: Selected Bibliographical Abstracts. Ralph A. Schaefer and William King. *Plating,* v. 39, May 1952, p. 487-494; June 1952, p. 627-634; July 1952, p. 769-780.

American Electroplaters' Society Research Project No. 8. Brief foreword and introduction, and abstracts covering years 1875-1951. Latter were selected to include the important researches in the above field as they relate to electrodeposition and allied fields. (L17, P15)

684-L. Choice of Plates or Painted Finish for Die Cast Zinc Surfaces. *Precision Metal Molding,* v. 10, July 1952, p. 46-47, 49, 53, 65.

Reviews the plating and painting cycles being employed by a manufacturer of kitchen appliances. (L17, L26, Zn)

685-L. Finishing Commercial Trucks at Reo Motors, Inc. Bryant W. Pocock. *Products Finishing,* v. 16, July 1952, p. 20-26, 28.

(L general, T21, ST)

686-L. Nikon Finishing Methods Stress Quality. Ezra A. Blount. *Products Finishing,* v. 16, July 1952, p. 32-34, 36.

Finishing methods for Japanese-made cameras. Base metals are Al and brass. Coated with various metals and nonmetals. (L general, Al, Cu)

687-L. Britehoning of Plumbing Parts Effects Large Savings. Herbert Chase. *Products Finishing,* v. 16, July 1952, p. 38-40, 42.

Installation of two wet barrels with accessory equipment avoids high costs of polishing on cast and screw-machine brass products, at American Radiator & Standard Sanitary Corp. (L10, Cu)

688-L. Spotlighting Finishing Progress. Allen G. Gray. *Products Finishing,* v. 16, July 1952, p. 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82.

Reviews of recent literature on protection of steel against atmospheric corrosion, regeneration of chromic acid solutions, and low-pressure spraying of porcelain enamels. (L general)

689-L. Some Aspects of the Manufacture of Sheet Steel for Vitreous Enamelling. E. Marks. *Sheet Metal Industries,* v. 29, July 1952, p. 587-592.

What recent changes in sheet manufacture mean to the enameler, and why they result in a product more trouble-free in enameling. Photographs and graphs. (L27, D general, F23, ST)

690-L. The Mechanical Surface Finishing of Metals. (Continued.) G. T. Colegate. *Sheet Metal Industries,* v. 29, July 1952, p. 645-650.

Polishing materials—methods of applying; choice of compound; binding media; and abrasives. Tables. (To be continued.) (L10)

691-L. Discussion on "The Finishing of Motor-Car Bodies." *Sheet Metal Industries,* v. 29, July 1952, p. 651-656.

Discussion at the Spring 1952 meeting of S.A.S.M.U.T.A. in London where various processes and problems were considered, including phosphating, Bonderizing, and painting. (L14, L26, ST)

692-L. Blast Cleaner Speeds Casting Flow. *Steel,* v. 131, July 7, 1952, p. 95.

Cleaning of castings at Eclipse Lawn Mower Co., Prophetstown, Ill. (L10)

693-L. Coating Extends Pipe Life. *Steel,* v. 131, July 7, 1952, p. 98, 100.

Use of porcelain enamel prolongs black-steel pipe life 12-20 times in Al fluxing and degassing operations. (L27, E25, Al, ST)

694-L. Hot Dip Aluminizing Affords Protective Surface. J. B. Russell. *Steel,* v. 131, July 14, 1952, p. 100, 102.

Coating applied by continuous process resists oxidation and scaling at elevated temperatures. Beryllium minimizes oxidation of bath and produces a high-luster surface. Effects on mechanical properties. (L16, Q general, Al)

695-L. Wire Brushing Shows 60 to One Production Gain Over Hand Work. Frank B. Hunter. *Western Metals,* v. 10, June 1952, p. 42-43.

Experiences of Wm. R. Whittaker Co., Los Angeles, in production of a specific part. (L10)

696-L. Complex Stainless Parts Resist Corrosion When Electropolished. George L. Shriver. *Western Metals,* v. 10, June 1952, p. 51-52.

How electropolishing achieves a smooth, lustrous surface by cutting down the high spots on the surface of the metal to make a smoother plane. Resulting chemically pure surface increases corrosion resistance in the 400 series stainless steels under ordinary operating conditions by nearly 450% and in the 300 series by 750%. (L13, R general, SS)

697-L. An Analysis of Metal Coatings. R. A. Schaus. *Western Metals,* v. 10, June 1952, p. 56-59.

Several processes which offer corrosion resistance to specific media and can be applied to a variety of shapes of steel articles. The principal metal coatings used are Zn, Sn, Pb, Cu, Cr, Si, Al and stainless steel. (L general, ST)

698-L. Coating Metal Used in Hot-Dip Galvanizing. Parts III-IV. (Concluded.) Wallace G. Imhoff. *Wire and Wire Products,* v. 27, June 1952, p. 575-578, 630; July 1952, p. 686-689, 692.

Three classes of metals that are added to baths to achieve certain objectives in coatings—namely, the very common metals such as Al, Sn, Sb, Cu, and Cd; various metals such as Ni, Cr, Mg, Bi, As, W, and alloys of Si and Mn; and mixtures of the above. July installment: Coating qualities resulting from different galvanizing bath compositions. (L16, Zn, CN)

699-L. Symposium: Mechanical Cleaning of Rods and Wire. William M. Baldridge, E. T. Miller, and Floyd M. Hauger. *Wire and Wire Products,* v. 27, July 1952, p. 672-675, 709-711.

Round-table discussion. (L10)

700-L. (Book) Handbuch der Metallbeizerei. Eisenwerkstoffe. (Handbook of Metal Etching. Ferrous Metals.) Ed. 2. Hermine Vogel and Alfred Keller, editors. 538 pages. 1951. Verlag Chemie, G.m.b.H., Weinheim-Bergstrasse, Germany.

A comprehensive treatise on etching and pickling of iron and steel, in theory and practice. Covers all chemical surface treatments. Numerous tables, graphs, diagrams, photomicrographs, footnote references, etc. (L12, Fe, ST)

M

METALLOGRAPHY, CONSTITUTION AND PRIMARY STRUCTURES

265-M. Report of Committee E-4 on Metallography. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 482-485.

Previously abstracted from Preprint 86. See item 176-M, 1951. (M21)

266-M. Microstructural Instability of Steels for Elevated Temperature Service. G. V. Smith, W. B. Seens, H. S. Link, and P. R. Malenock. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 895-912; disc., p. 912-917.

Previously abstracted from Preprint 28. See item 205-M, 1951. (M17, Q6, Q29, AY, SS)

267-M. Report of Committee E-4 on Metallography. *American Society for Testing Materials,* Preprint 53, 1952, 29 pages.

Consists largely of Subcommittee Report on electron microstructure of bainite in steel. Illustrated by 23 micrographs. (M27, ST)

268-M. Titanium Alloy Development Mapped. W. Rostoker and H. D. Kessler. *Iron Age,* v. 169, June 19, 1952, p. 136-142.

Deals chiefly with equilibrium phase relationships between Ti and other metals; kinetics of solid-state reactions; and heat treatment phenomena. Information on a wide variety of alloys and systems of Ti. Phase and TTT-diagrams, and photomicrographs. 12 ref. (M24, N general, J general, Ti)

269-M. Demountable X-Ray Tube for Crystallography. T. B. Rymer and P. G. Hambling. *Journal of Scientific Instruments,* v. 29, June 1952, p. 192-194.

A medium-power, demountable, shockproof X-ray tube. Construction is simple; various parts fit together to form a very rigid unit easily dismantled and reassembled without disturbing the focus. Photograph and sectional drawing. (M26)

270-M. Carbides in High Speed Steel—Their Nature and Quantity. Francis Kayser and Morris Cohen. *Metal Progress,* v. 67, June 1952, p. 79-85.

Each of eight grades of high speed steel was investigated for types of carbides present, volume and weight percentage, and transformations occurring during commercial austenitizing. Tables and graphs. (M26, J22, TS)

271-M. Universal Specimen Mount for Pole Figure Determination Using the Schulz-Decker Technique. D. N. Williams and D. S. Eppelsheimer. *Review of Scientific Instruments,* v. 23, May 1952, p. 229-231.

A universal specimen mount is developed for use with a Geiger counter-equipped X-ray unit to take advantage of the technique suggested by Schulz, Decker, Asp, and Harker. Sample pole figures of cold-rolled Ti and α-brass are presented. (M23, Ti, Cu)

272-M. X-Ray Helps Produce Better Wire by New Methods Which Analyze Crystal Structure of Base Metals. John Buhler. *Wire and Wire Products,* v. 27, June 1952, p. 570-573.

Use of X-ray diffraction. Compares X-ray diffraction and spectrometry with X-ray fluoresence. Application in qualitative and quantitative work. (M22, Ag, Cu, Ni, Cr)

273-M. (Czech.) Comparison of Various Methods of Determining Austenitic Grain Sizes in Steel. F. Labonek and L. Jenicek. *Hutnické Listy,* v. 7, Apr. 1952, p. 171-178.

The "fracture grain size" method is recommended for general use, the Gerasimenko and Cu-diffusion methods should be used only for quality control, and the McQuaid-Ehn method should be used only for carburizing steels. 92 ref. (M27, ST)

274-M. (German.) The Conception of Determination of Homogeneity. H. Franssen. *Metall,* v. 6, June 1952, p. 302-305.

Theoretical considerations and methods of measurement. Illustrated by measurements on different materials (porous, sintered lead bronze on an iron base; structural steel; carbonyl iron; Cu-Ni alloy, bessemer steel; Cr-Mo steel; and nonmetallics.) Tables and graphs. (M27)

275-M. Electron-Diffraction Study of Iron Carbides in Bainite and Tempered Martensite. A. E. Austin and C. M. Schwartz. *American Society for Testing Materials,* Preprint 165, 1952, 4 pages.

Samples of bainite and tempered martensite, etched to leave the carbide phases in relief, were examined by electron diffraction. The steel was essentially plain carbon, of eutectoid composition. Cementite was found in samples isothermally transformed or quenched and tempered at or above 500° F. Both cementite and epsilon iron carbide exist at 500° F. In martensite tempered at 400° F., only epsilon iron carbide was found. (M22, N8, CN)

276-M. A Method for the Electron and Optical Microscopic Examination of Identical Areas. E. D. Hyam and J. Nutting. *British Journal of Applied Physics,* v. 3, June 1952, p. 173-176.

A refinement of the usual stripping technique. An attachment fits over the objective lens of a bench metallurgical microscope, and enables replica-supporting grids to be precisely positioned over a feature of interest in the microstructure of a metal surface. Operation and application. Apparatus drawings and micrographs. (M21)

277-M. Micro-Analysis in Metallurgy; a Survey of German Investigations. *Chemical Age,* v. 66, June 7, 1952, p. 865-868.

Recent German work, using metallographic techniques. (M21, S11)

278-M. Intensity Calculation for Determining Weight Percentage in a Binary Alloy by X-Ray Fluorescent Analysis. P. K. Koh, B. Caugherty, and R. E. Burket. *Journal of Applied Physics,* v. 23, June 1952, p. 698.

A simple calculation applicable when the binary alloy consists of neighboring elements in the periodic table. Example is given for an Fe-Co alloy. Table. (M26, Co, Fe)

279-M. Borides of Some Transition Metals. Benjamin Post. *Journal of Chemical Physics,* v. 20, June 1952, p. 1050-1051.

Several unreported transition metal borides were prepared in a high-temperature investigation of several metal-C-B systems. Some structural characteristics of these new phases were determined by means of an X-ray diffraction investigation of powdered samples. (M26, W, B, Mo, Ti, Zr)

280-M. The Structure and Some Properties of Titanium-Oxygen Alloys Containing 0-5 At. % Oxygen. A. E. Jenkins and H. W. Worner. *Journal of the Institute of Metals,* v. 80, Dec. 1951, p. 157-166.

By means of measurements of thermo-electric power at various temperatures and by quenching experiments on alloys made with refined Ti, limits of the ($\alpha + \beta$) region up to 5 at. % O_2 were established. The impurities present in the commercial grade of metal cause a marked broadening of the $\alpha \rightleftharpoons \beta$ transformation range. It was found possible to develop techniques for forging and swaging alloys containing as much as 3.5 at. % O_2. Alloys containing more than 1.5 at. % may be hot worked, but they are more or less brittle at normal temperatures. Factors affecting cold drawing and annealing of alloy wires were studied. Proof stress, nominal ultimate stress, plastic elongation, and hardness of annealed alloys were determined. 12 ref. (M27, F22, Q general, Ti)

281-M. The Sigma Phase in Binary Alloys of the Transition Elements. A. H. Sully. *Journal of the Institute of Metals,* v. 80, Dec. 1951, p. 173-179.

Appearance of sigma phase can be satisfactorily accounted for if it is assumed that incidence is determined by a critical excess of electrons in bond orbitals over vacancies in the 3d atomic orbitals. In alloys of Co and Fe with Cr, Fe, Ni, and Co with V, and Cr and V with Mn, predictions of the boundary of the homogeneous sigma-phase region made on the basis of this hypothesis agree well with experimental data where available. 28 ref. (M26)

282-M. Observations on Nodular Graphite. H. M. Weld, R. L. Cunningham, and F. W. C. Boswell. *Journal of Metals,* v. 4, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 738-742.

Chemical analysis shows that the partition of the Mg addition between the metal and the graphite is independent of whether the graphite is in the form of nodules or flakes. The bright central spot observed in nodular-graphite polished sections is shown to be due to the structure of the nodules. Tables, diagrams, and electron micrographs. 13 ref. (M27, CI)

283-M. A Study of Grain Shape in an Aluminum Alloy and Other Applications of Stereoscopic Microradiography. W. M. Williams and Cyril Stanley Smith. *Journal of Metals,* v. 4, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 755-765.

Introduces a new method of studying individual grains in alloys which may find use in other metallurgical researches. Using stereoscopic microradiography, the shape of 91 contiguous grains in a worked and annealed Al-Sn alloy were analyzed and some topological quantities calculated. Diagrams, tables, micrographs; stereoscopic radiographs and drawings. 18 ref. (M23, M27, Al)

284-M. Titanium-Copper Binary Phase Diagram. A. Joukainen, N. J. Grant, and C. F. Floe. *Journal of Metals,* v. 4, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 766-770.

Methods used for determination of the diagram include metallographic examination and X-ray and thermal analyses. The system was first worked out using high-purity sponge Ti and O_2-Cu. The high-Ti region was next determined more accurately, using iodide Ti and vacuum-melted, O_2-free Cu. Graphs, photomicrographs and X-ray patterns. (M24, Cu, Ti)

285-M. Titanium-Oxygen Alloys. *Metal Progress,* v. 61, May 1952, p. 124-126, 128. (Condensed from "The Structure and Some Properties of Titanium-Oxygen Alloys Containing 0-5 At.% Oxygen". A. E. Jenkins and H. W. Worner.)

Previously abstracted from *Journal of the Institute of Metals.* See item 280-M, 1952. (M27, F22, Q general, Ti)

286-M. X-Ray Studies of Metal Structures. W. H. Taylor. *Metal Treatment and Drop Forging,* v. 19, June 1952, p. 259-262.

Postwar research at Crystallographic Laboratory, Cambridge. Main topics are: X-ray microbeam technique; X-ray examination of modulated structure in alloys; alloys of Al with transition metals; and sigma-phase alloys. 41 ref. (M26, M27)

287-M. The Effect of Four Transition Metals on the α/β Brass Type of Equilibrium. J. B. Haworth and W. Hume-Rothery. *Philosophical Magazine,* ser. 7, v. 43, June 1952, p. 613-619.

Experimental investigation of the effect of Mn, Fe, Co, and Ni on the α/β equilibrium in Cu-Zn and Cu-Al alloys at 672° C. For this purpose the isothermal sections of the ternary systems in the regions concerned were determined by annealing and microscopical examination. The bearing of the results on the theory of the transition metals and their alloys. (M24, N6, Mn, Fe, Co, Ni)

288-M. Elementary Structure and Slip Band Formation in Aluminium. D. Kuhlmann-Wilsdorf. *Philosophical Magazine,* ser. 7, v. 43, June 1952, p. 632-644.

From electron micrographs of deformed high-purity Al, numerical estimates for spacing, length, and amount of glide of the individual elementary lines were obtained. Experimental evidence relating to the problem, whether or not slip starts at the crystal surfaces. 25 ref. (M27, Q24, Al)

289-M. (German.) **The Iron-Phosphorus-Antimony Phase Diagram.** Rudolf Vogel and Dietrich Horstmann. *Archiv für das Eisenhuttenwesen,* v. 23, Mar./Apr. 1952, p. 127-134.

The above system was investigated as to structure and thermal behavior. A process is developed which makes it possible, by adding Cu, to determine metallographically and chemically the saturation content of P in molten Sb. Phase diagram of the system, and the conditions for a second ternary boiling point. Graphs, diagrams, and micrographs. (M24, Fe, Sb, P)

290-M. (German.) **The Top-Illumination, Phase-Contrast Microscope and Its Use in Metallography.** Erich Witten. *Archiv für das Eisenhuttenwesen,* v. 23, Mar./Apr. 1952, p. 145-150.

Microscope with a new top-illumination, phase-contrast set-up. Examples of application. (M21)

291-M. (German.) **The Iron-Phosphous-Manganese System.** Rudolf Vogel and Josef Berak. *Archiv für das Eisenhüttenwesen,* v. 23, May-June 1952, p. 217-223.

Proposes a phase diagram of the Fe_2P-Mn_2P-Mn system on the basis of thermal and structural investigations. Graphs and micrographs. 15 ref. (M24, Fe, Mn, P)

292-M. (German.) **Quantitative Description of Crystal Structure by Means of Displacements.** Albert Kochendörfer. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 283-294.

Displacements and their properties. The possibility of defining the structure of the real crystals by means of the displacements. Grain and mosaic junction lines, displacements as a source of defects, and mosaic structure. Diagrams. 45 ref. (M26)

293-M. (German.) **Slip Shrinkage in Mixtures of Metals and Metallic Oxides, and in Boron Carbide.** Walther Dawihl. *Zeitschrift für Metallkunde,* v. 43, May 1952, p. 138-142.

Proposes application of the theory that formation of slip layers causes shrinkage in metals and also in mixtures of metals with metallic oxides. Method of experimentation. Results obtained with mixtures of Fe and oxides of Al, Cr, Mg, Mn, Ti, or Fe are charted, tabulated, and illustrated by micrographs. Also results obtained with B_4C. (M26, Q24, Fe, C-n)

294-M. (Russian.) **Change of Coordination Number During Melting of Metals.** O. Ia. Samoilov. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Mar. 21, 1952, p. 447-450.

Previously published data are used for a theoretical discussion of the change of structures of metals as the melting point is approached. Data are tabulated and charted for a series of nonferrous metallic elements. (M27, N12)

295-M. (Russian.) **Radiographic Investigation of Fracture Surfaces of Impact Specimens.** M. P. Zheldak. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 21, 1952, p. 843-845.

X-ray studies were made on fractured Mesnager specimens of highly alloyed, semiferritic steel, over a range from −20 to 100° C. Includes diffraction patterns. (M22, Q6, AY)

296-M. (Russian.) **Investigation of Alloys of the Fe-Cr System and Certain Alloys of the Fe-Cr-Mn System by a Magnetic Analysis Method.** N. I. Korenev and E. I. Koreneva. "Izvestiia Sektora Fiziko-Khimicheskogo Analiza", v. 20 (Academy of Sciences of the USSR), p. 54-65.

Data from magnetic analysis of the above alloys agrees with the results of hardness tests, microstructure, and X-ray analyses. 14 ref. (M23, Fe, Cr, Mn)

297-M. (Russian.) **Equilibrium Diagram of the Copper-Magnesium-Zinc System.** V. I. Mikheeva and O. N. Kruikova. "Izvestiia Sektora Fiziko-Khimicheskogo Analiza", v. 20, (Academy of Sciences of the USSR), p. 76-93.

Experimental data were obtained to construct the above diagram. Data are tabulated and charted. Includes 24 photomicrographs. 13 ref. (M24, Cu, Mg, Zn)

298-M. (Russian.) **Methods of Investigating the Structure of Metals With the Electron Microscope.** D. S. Shraiber. "Izvestiia Sektora Fiziko-Khimicheskogo Analiza", v. 20 (Academy of Sciences of the USSR), p. 304-316.

Construction and use of the electron microscope for metallographic studies. Various techniques. Includes several photomicrographs. (M21)

299-M. (Spanish.) **Technique of Preparation and Mounting of Crystals for Analytical X-Ray Diffraction Studies.** I. Asensio Amor. *Nucleo,* v. 7, May 1952, p. 186-190.

A review on the basis of the literature. The case in which the substance is placed in a capillary tube; where the substance must adhere to the capillary tube; and where the substance is placed in special devices. 54 ref. (M22)

300-M. The Formation of the Ni_2Al Phase in Nickel-Aluminium Alloys. R. W. Floyd. *Journal of the Institute of Metals,* v. 80, June 1952, p. 551-553.

The Ni_2Al phase is the product of a peritectic reaction between the melt and the β(NiAl) phase. This was established by a comparison of the microstructures of small ingots of a series of binary Ni-Al alloys containing 20-30 at.% Al, with those of a corresponding series in which 2½ at.% of the Ni was replaced by Cr. Phase diagrams and photomicrographs. (M24, Ni, Al)

301-M. Crystal Structure of the Intermetallic Compound $Mg_{32}(Al, Zn)_{49}$ and Related Phases. Gunnar Bergman, John L. T. Waugh, and Linus Pauling. *Nature,* v. 169, June 21, 1952, p. 1057-1058.

A complete structure determination was made by the stochastic method. Verification of the structure with X-ray data was obtained from single crystals of the Mg-Al-Zn alloy. (M26, Mg, Al, Zn)

302-M. (Book) **Industrial High Vacuum.** J. R. Davy. 243 pages. 1951. Sir Isaac Pitman & Sons, Ltd., Parker St., Kingsway, London W.C. 2, England.

A comprehensive survey dealing with design and manipulation of vacuum installations. Sufficient basic theory for understanding the principles involved. Application to major uses, methods of handling, and control of the products. Chapters of special metallurgical interest are: evaporation technique for thin films; deposition of metals; detailed treatment of some metals; semitransparent films; further applications and properties of thin films; and vacuum metallurgy. (M23, L25, C25)

N

TRANSFORMATIONS AND RESULTING STRUCTURES

196-N. Preparation of Bicrystalline Lead Plates. F. W. Brugman and T. J. Tiedema. *Applied Scientific Research,* v. 3, sec. A, No. 3, 1952, p. 250-252.

Technique of preparation which can be considered as a variation on the methods of Dunn and Tiedema for preparing crystals with a predetermined orientation by recrystallization of test pieces of solid metal. (N5, Pb)

197-N. Theory of Nucleation in Solids. Roman Smoluchowski. *Industrial and Engineering Chemistry,* v. 44, June 1952, p. 1321-1323.

The basic problem, and complications caused by a departure from conditions for applicability of Volmer's theory. Various theories and their comparisons with experimental data. In particular, the nucleation theory of recrystallization and its successful interpretation of observations. 20 ref. (N2)

198-N. Precipitation From Solid Solution. J. C. Fisher, J. H. Hollomon, and J. G. Leschen. *Industrial and Engineering Chemistry,* v. 44, June 1952. p. 1324-1327.

Shows that elastic strains can be present in particles that precipitate from solid solution, and in the surrounding parent phase as well. When nucleation theory is modified to include the effects of elastic distor-

tion, most of the characteristics of precipitation from solid solution can be accounted for. 12 ref. (N7)

199-N. Strain Hardening and Aging. H. A. Unckel. *Iron & Steel,* v. 25, June 1952, p. 273-278.

A study on the quench-aging and strain-aging behavior of low-carbon steels with different carbon contents and different treatments. Includes graphical and tabular data on hardness and tensile properties. Photomicrographs. 12 ref. (N7, J27, CN)

200-N. Transitions in the Chromium-Manganese and Nickel-Vanadium Sigma Phases. W. B. Pearson. *Nature,* v. 169, May 31, 1952, p. 934.

Brief note on these transitions and on structures present above the transition temperature. (N6, Cr, Mn, Ni, V)

201-N. (French.) **X-Ray Study of the Transformations of 7%+Mg-Al Alloys During Tempering.** A. R. Weill. *Revue de Métallurgie,* v. 49, May 1952, p. 364-373.

Previously abstracted from *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences.* See item 94-N, 1952. (N7, Al)

202-N. (French.) **Contribution to the Study of the Aging of Iron-Carbon Alloys by Measuring Their Electric Conductivities.** H. J. Seemann and W. Dickenscheid. *Revue de Métallurgie,* v. 49, May 1952, p. 379-384.

Experiments on α-Fe alloys with carbon, using procedure recently described by Gruhl. Alloys containing 0.04 and 0.16% C were studied most thoroughly. Those containing 0.62 and 0.92% C were also investigated. Graphs and micrograph. (N7, P15, Fe, ST)

203-N. (German.) **Measurement of Diffusion Layers in Iron by Means of Microhardness Testing.** Ulrich Zwicker. *Metalloberfläche,* ser. A, v. 6, June 1952, p. A81-A87.

How the depth of penetration of diffusion layers in iron can be measured by microhardness testing. Method for interpreting the curves; various types of diffusion are compared. Some examples of the effect of alloys and of electrolytic intermediate layers. Graphs. (N1, Q29, Fe)

204-N. (Russian.) **The Stabilization of Austenite in Relation to the Martensite Transformation.** G. N. Bogacheva and V. D. Sadovskii. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 1, 1952, p. 569-572.

Experiments were made by changing the rate of cooling the steel or by reheating slightly before the M^s point is reached. Data are charted for several high and low-alloy steels, including a 30.5% Ni iron alloy. (N8, AY, SS, Fe)

205-N. (Russian.) **Growth of Spherical and Needle-Shaped Crystals of Binary Alloys.** G. P. Ivantsov. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 1, 1952, p. 573-576.

A mathematical analysis. (N12)

206-N. (Russian.) **Investigation of the Decomposition of the Solid Solution of Mg in Al.** M. I. Zakharova and L. M. Baldina: "Uchenye Zapiski. Vypusk 134. Fizika. Kniga Piataia" (Scientific Records. Vol. 134. Physics. Vol. 5), Lomonsov's Moscow State University, 1949, p. 100-106.

An X-ray study was made of the dependence of lattice constants of the 10% Mg-Al alloy on annealing time after various treatments. Data are tabulated. (N7, M26, Al)

207-N. (Russian.) **Investigation of the Phenomenon of Recovery of Duralumin During Aging.** M. I. Zakharova and N. V. Lukovskaia. "Uchenye Zapiski. Vypusk 134. Fizika. Kniga Piataia." (Scientific Records. Vol. 134. Physics. Vol. 5), Lomonsov's Moscow State University, 1949, p. 107-112.

A study was made of hardness recovery in duralumin after various heat treatments. Data are tabulated. (N7, Al)

208-N. On the Kinetics of Order in Ni_3Mn. Lewis R. Aronin. *Journal of Applied Physics,* v. 23, June 1952, p. 642-643.

A study of kinetic behavior in specimens initially cooled through the ordering range as a function of subsequent prolonged isothermal heat treatments. Room-temperature measurement of electrical resistivity and saturation induction gives evidence substantiating existence of ordered domains. Anomalies, and dependence of equilibrium, resistivity, and magnetic phenomena on domain growth. Graphs. (N10, P15, P16, Ni)

209-N. Thermoelastic Analysis of Transformations in Copper Alloys. R. Cabarat, P. Gence, L. Guillet, and R. Le Roux. *Journal of the Institute of Metals,* v. 80, Dec. 1951, p. 151-156.

Effect of allotropic transformations on elastic modulus and logarithmic decrement of Cu alloys was investigated. To determine these properties, a specimen was subjected to longitudinal vibrations of small amplitude and high frequency under reduced pressure. Formation of body-centered cubic phases on heating eutectoid Cu-Al and Cu-Sn alloys results in a marked decrease in elastic modulus, while the logarithmic decrement assumes large values before and during the transformation. 14 ref. (N6, Q21, Cu)

210-N. Principles of Zone-Melting. W. G. Pfann. *Journal of Metals,* v. 4, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 747-753.

Consequences of the zone-melting manner of "freezing" are examined with respect to solute distribution in the ingot, with particular reference to purification and to prevention of segregation. Results are expressed in terms of the number, size, and direction of travel of the zones, the initial solute distribution, and the distribution coefficient confined to theory and procedures. Numerous graphs and diagrams. (N12)

211-N. Recrystallization Textures in Copper Wire. G. Bassi. *Journal of Metals,* v. 4, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 753-754.

Three electrolytic tough-pitch Cu wires of different initial textures were drawn and annealed varying amounts and at varying temperatures. Deformation and recrystallization textures were examined by X-ray diffraction. (N5, Q24, Cu)

212-N. Effect of Molybdenum and of Nickel on the Rate of Nucleation and the Rate of Growth of Pearlite. R. Wayne Parcel and Robert F. Mehl. *Journal of Metals,* v. 4, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 771-780.

A systematic study of nucleation and growth for eutectoid alloy steels containing Mo and Ni. New data on the effect of Mo on the interlamellar spacing of pearlite. Tables, graphs, and photomicrographs. 23 ref. (N8, AY)

213-N. The Self-Perpetuating Step in Crystal Growth From the Melt. Bruce Chalmers and Ursula M. Martius. *Philosophical Magazine,* ser. 7, v. 43, June 1952, p. 686-687.

The general theory of crystal growth and the problem of nucleation of new layers on a growing crystal surface. (N12)

214-N. (French.) **The Possibility of Utilizing Oxidation Coloring at Low Temperatures for Studying the Recrystallization of Iron.** Jean Bardolle. *Comptes Rendus hebdomadaires des Séances de l'Academie des Sciences,* v. 234, May 26, 1952, p. 2200-2202.

Proposes use of films formed on polished metal surfaces during oxidation or sulfuration for surface investigations. Micrographs illustrate typical results. (N5, M23, Fe)

215-N. (French.) **Theory of Order-Disorder Modifications in $AuCu_3$ Alloys.** Gérard Fournet. *Comptes Rendus hebdomadaires des Séances de l'Academie des Sciences,* v. 234, May 19, 1952, p. 2049-2051.

The Yvon theory. Theoretical findings show satisfactory agreement with practical results. The method outlined for study of order-disorder transformations makes it possible to predict quantitatively ordering phenomena at a small distance from experimental data for a large distance. Gives a new example of a relation between intensity of diffuse X-rays to energies of interaction between atoms. Experimental data for 400, 460, and 550° C. are tabulated. (N10, Au, Cu)

216-N. (French.) **Contribution to the Study of Aging of Mild Steel.** J. A. Lemoine and A. Sariban. *Revue de la Soudure; Lastijdschrift,* v. 8, No. 2, 1952, p. 84-104.

Aging by cold-working, aging after quenching, and some experimental results. Tables contain results on cold worked and quenched samples. Proposes a new method for measuring aging. 12 ref. (N7, J27, CN)

217-N. (German.) **Initiation Period of the Austenite Transformation With Various Types of Cooling.** Franz Wever and Otto Krisement. *Archiv für das Eisenhuttenwesen,* v. 23, May-June 1952, p. 229-237.

Various methods for plotting the time-temperature-transformation diagram. Aspects of this diagram, and results for different types of steels compared with experimental findings. Data are tabulated and charted. 10 ref. (N8, ST)

218-N. (English.) **Growth Spirals and Polytypism of Silicon Carbide Crystals.** Ajit Ram Verma. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 268-274.

The different growth features observed on the faces of SiC crystals can be divided into growth spirals, which are of three types: elementary spirals; oriented overgrowths; holes, hollows, and spots. 10 ref. (N12, M26, Si, C-n)

219-N. (German.) **Nucleus Formation and Growth of Crystals in Solid Metals.** W. G. Burgers. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 318-323.

Experiments concerning nucleus formation and nature of the nuclei in recrystallization of deformed metal specimens. Reviews theoretical considerations on the basis of the literature. Micrograms and diagrams. 48 ref. (N2, N12)

220-N. (German.) **Diffusion of Metals in Sintered Al Specimens.** W. Seith and G. Löpmann. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalishe Chemie,* v. 56, Apr. 1952, p. 373-379; disc., p. 379.

Investigation of a new Al sintered material "SAP"; and on diffusion of Ag, Cu, Mg, Si, and Zn in it. Experiments in which the contacting surfaces were subjected to preliminary electrolytic oxidation. Micrographs. (N1, Al)

221-N. (German.) **Investigations by Means of Radioactive Indicators of Exchange and Diffusion Processes in Silver Electrodes.** Heinz Gerischer and Wolf Vielstich. *Zeitschrift für Electrochemie; Berichte der Bunsengesell-*

schaft für physikalische Chemie, v. 56, Apr. 1952, p. 380-386; disc., p. 386.

Experiments on the exchange between Ag metal and Ag ions by means of Ag^{110}. Experimental arrangement. Results, based on kinetic analysis of the process. Tables and graph. (N1, Ag)

222-N. (Russian.) Problems of the Kinetics of Graphitization of Cast Iron. K. P. Bunin and I. V. Salli. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 21, 1952, p. 841-842.

The formation of graphite in cast iron was studied by vacuum annealing at 950° C., and by microscopic examination. (N8, CI)

223-N. (Russian.) Stress Fields Arising During Decomposition of Solid Solutions Near Spherical Nuclei of a New Phase. L. N. Aleksandrov and B. Ia. Luibov. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 21, 1952, p. 833-835.

A theoretical discussion with emphasis on the austenite-ferrite transformation of low-carbon steels. (N8, CN)

224-N. Segregation of Iron and Phosphorus at the Grain Boundaries in 70:30 Brass During Grain Growth. H. M. Miekk. *Journal of the Institute of Metals,* v. 80, June 1952, p. 569-576.

Effects of P, of Fe, and of P + Fe on grain size and hardness; correlation between hardness and grain size; and grain size vs. temperature for different critical amounts of P and Fe. Theory. Graphs. 19 ref. (N3, Q29, Cu)

P

PHYSICAL PROPERTIES AND TEST METHODS

366-P. The Anisotropy of Electrical Resistivity of Cold-Drawn Wires of Some Cubic Metals and Alloys. T. Broom and W. K. Clothier. *Australian Journal of Scientific Research,* ser. A, v. 5, Mar. 1952, p. 119-127.

A special a.c. technique was devised to measure and compare the transverse resistivities of wires. In drawn wires of several metals and alloys, resistivities measured in the longitudinal and transverse directions are shown to differ. In Cu, longitudinal resistivity was slightly less than transverse, but in α-brass and α-Al bronze it was greater by about 3%. Suggests that an explanation may be found in terms of lattice disturbances associated with dislocations. (P15, Cu)

367-P. On the Anisotropy of Electrical Resistivity of Deformed Cubic Metals and Alloys. T. Broom. *Australian Journal of Scientific Research,* ser. A, v. 5, Mar. 1952, p. 128-134.

Change of resistivity on annealing cold rolled metals was found to depend on direction of measurement for Cu-Ni, steel, α-brass, and sterling silver, while no such variation was observed for Al, Cu, or Ni. An explanation of anisotropy both in strip and in wire is advanced in terms of lattice disturbances such as dislocations, vacant sites, and faults. Influence of deformation, recovery, and a second phase on anisotropy developed in brasses. 11 ref. (P15, Cu, Ni, ST, Ag)

368-P. A High Permeability Nickel Iron Alloy. *Engineer,* v. 193, June 6, 1952, p. 775.

Physical properties of a new British alloy, "Permalloy F," which has a markedly rectangular hysteresis loop and a low value of coercive force, and is suitable as a core material for all forms of saturable reactors. (P16, Ni, Fe, SG-n, p)

369-P. Magnetic Nickel-Iron Alloy. *Engineering,* v. 173, May 30, 1952, p. 691.

See abstract from *Engineer;* item 368-P, 1952, above. (P16, Fe, Ni, SG-n, p)

370-P. Interaction of Phosphorus-32 Beta Rays With Matter. Gordon L. Brownell. *Nucleonics,* v. 10, June 1952, p. 30-35.

Energy distribution of β-rays from a thin P^{32} source mounted on collodion film was measured before and after addition of various metallic absorbers and backscatterers. Angular distribution was also determined. Graphs. 16 ref. (P13, Pt, Al, Cu, Sn)

371-P. The High Frequency Resistance of Metals in the Normal and Superconducting State. C. J. Grebenkemper and John P. Hagen. *Physical Review,* ser. 2, v. 86, June 1, 1952, p. 673-679.

Resistance of Pb, In, and Sn was measured at frequencies of 9000 mc. per sec. using resonant-cavity techniques. Preliminary measurements on Sn at 24,000 mc. per sec. also were made. Experimental techniques and measurement procedure. (P15, Pb, In, Sn)

372-P. Nuclear Magnetic Resonance of Hydrogen Absorbed Into Palladium Wires. R. E. Norberg. *Physical Review,* ser. 2, v. 86, June 1, 1952, p. 745-752.

Details of experiment. Graphs. (P16, Pd)

373-P. Scattering of Electrons in Metals by Dislocations. D. L. Dexter. *Physical Review,* ser. 2, v. 86, June 1, 1952, p. 770-774.

The problem of the change in electrical conductivity in metals upon cold working is treated by the method of Koehler in which the scattering of electrons by pairs of parallel edge-type dislocations is assumed to be the major effect. A comparison is made between the electronic shielding used by Koehler and the shielding assumed by Landauer. The scattering matrix element is also evaluated, and anisotropy in the resistivity is discussed. (P15)

374-P. Low Temperature Thermal Expansion of Uranium. Adam F. Schuch and Henry L. Lacquer. *Physical Review,* ser. 2, v. 86, June 1, 1952, p. 803.

A study of the elastic constants of U. Graph. (P11, U)

375-P. The Thermal Conductivity of Metals at Low Temperatures. I. The Elements of Groups 1, 2 and 3. II. The Transition Elements. K. Mendelssohn and H. M. Rosenberg. *Proceedings of the Physical Society,* v. 65, sec. A, June 1, 1952, p. 385-394.

Part I: Thermal conductivities of Cu, Ag, Au, Mg, Cd, Al, In and one polycrystalline and two single-crystal specimens of Zn were measured in the range 2-40° K. Part II: Thermal conductivity in the same range was measured for Ti, Mn, Fe, Ni, Zr, Cb, Mo, Rh, Pd, Ta, W, Ir, Pt, U, and for a Pb single crystal. As a rule, the metals of group 8 exhibited much higher conductivity than the metals of the lower groups. Numerous graphs. 10 ref. (P11)

376-P. The Range-Energy Relation for Protons in Aluminium. D. H. Simmons. *Proceedings of the Physical Society,* v. 65, sec. A, June 1, 1952, p. 454-456.

Nuclear emissions were used to measure the energy loss of initially 10 Mev. protons in traversing a thickness of Al which reduces their energy to about 3 Mev. Tables. (P10, Al)

377-P. Ferromagnetic Resonance in Manganese Antimonide. G. D. Adam and K. J. Standley. *Proceedings of the Physical Society,* v. 65, sec. B, June 1, 1952, p. 454-455.

Ferromagnetic resonance absorption was studied in powdered specimens of MnSb at a wave length of 1.26 cm. and in the range 20° C. to the Curie point (315° C.). (P16, Mn, Sb)

378-P. Low Remanence and the Temperature Variation of Permeability of Silicon-Iron Alloys. E. W. Lee. *Proceedings of the Physical Society,* v. 65, sec. B, June 1, 1952, p. 455-456.

Observations suggest that the above properties of Si-Fe are closely connected and that both can be explained in terms of internal flux closure. Discusses measurements on alloys containing 0.9-14.0% Si. (P16, Fe)

379-P. The Influence of Heat Treatment on Magnetic Viscosity in Permanent Magnet Alloys. R. Street, J. C. Woolley, and P. B. Smith. *Proceedings of the Physical Society,* v. 65, sec. B, June 1, 1952, p. 461-462.

Briefly discusses literature. Graph shows results of measurements on Alnico specimens subjected to two different types of heat treatment. (P16, J general, SG-n)

380-P. Permeameter for Elevated Temperature Tests. Robert H. Esling. *Review of Scientific Instruments,* v. 23, May 1952, p. 247-248.

Design and electrical circuit of an apparatus for magnetic permeability testing. Three specimens of Type 416 stainless steel were prepared and tested—first at room temperature (80° F.), then at 450° F. (P16, SS)

381-P. Catalytic Effect of Several Metals on the Oxidation of Lubricating Oils. D. W. Sawyer. *Transactions of the American Society of Mechanical Engineers,* v. 74, Jan. 1952, p. 113-119; disc., p. 119-122.

Considerable evidence has accumulated to show that Al is especially well adapted for construction of many types of equipment for handling lubricating oils such as sumps, coolers, pistons, pumps, crankcases, and tubing. Compares the effects of various metals and alloys on properties of lubricating oils at several temperatures. It appears that Al alloys and stainless steel have only a very slight or no catalytic effect on oxidation of mineral oils and are more resistant than many of the other metals evaluated. Copper and low-carbon steel were found definitely to have an adverse effect upon properties of the oils. (P13, Al, SS, Cu, CN)

382-P. Electrical Potential Differences and Their Origin. J. A. V. Butler. "Electrical Phenomena at Interfaces" (Macmillan Co., New York), 1951. p. 1-29.

A fundamental discussion, with extensive references to the literature. Includes section on electrode potentials of metals. 30 ref. (P15)

383-P. Overpotential. J. O'M. Bockris. "Electrical Phenomena at Interfaces" (Macmillan Co., New York), 1951, p. 155-189.

A fundamental discussion. 142 ref. (P15)

384-P. Concentration Polarization and the Deposition of Metals. J. A. V. Butler. "Electrical Phenomena at Interfaces" (Macmillan Co., New York), 1951, p. 190-203.

A fundamental discussion. 52 ref. (P15, L17)

385-P. The Behaviour of Oxygen and Hydrogen at Electrodes. J. A. V. Butler. "Electrical Phenomena at Interfaces" (Macmillan Co., New York), 1951, p. 204-228.

A fundamental discussion. Adsorp-

tion of oxygen at anodes, electrolytic behavior of hydrogen, and formation of oxide films on noble metals. 138 ref. (P15, R1)

386-P. Progress in Metallurgy. B. A. Rogers and F. H. Spedding. "Annual Review of Nuclear Science." Vol. I. (Annual Reviews, Stanford, Calif.), p. 441-464.

Reviews effect of nuclear irradiation on properties of metals, new measurements on physical properties of thorium and uranium, data on alloys and compounds of thorium and uranium, application of radioisotopes to metallurgical investigations, newly published information on three metals of interest in reactor design, reports on liquid metals that may be usable in heat exchangers. 66 ref. (P general, S19, Th, U)

387-P. (German.) Fine-Wire Resistors for Measuring and Control Purposes. Computations and Applications. Otto Schultze. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, June 1, 1952, p. 473-480.

Method of computing size of wire of given alloys for specific resistors. Some new uses of fine-wire resistors. Illustrations and graphs. (P15)

388-P. (German.) Magnetic Measurements on Iron Amalgam to Determine Its Ferromagnetic Properties and Grain Size. Armin Mayer and Eckhart Vogt. *Zeitschrift für Naturforschung,* v. 7a, May 1952, p. 334-340.

Experimental studies on the effect of aging on magnetic properties confirm earlier reports that iron below a certain grain size (30A.) is paramagnetic. Data are charted. 16 ref. (P16, Fe)

389-P. (German.) Radiation From Freshly Vapor-Deposited Layers of Metals and Salts. H. Gobrecht and G. Barsch. *Zeitschrift für Physik,* v. 132, No. 2, 1952, p. 129-139.

Experiments made with vapor-deposited Sb, Ag, Al, and Fe, also KCl, NaCl, and K_2SO_4, to investigate the cause of electron emission. Results indicate that oxidation and surface adsorption are the causes of radiation; and that edges, scratches, variations in layer thickness, undercoating, and centers of metal formation influence rate of reaction.
(P10, L25, Sb, Ag, Al, Fe)

390-P. (German.) New Contributions to the Problem of Magnetic Transformation. Friedrich Fraunberger. *Zeitschrift für Physik,* v. 132, No. 2, 1952, p. 212-220.

Shows that magnetic transformation occurs in several steps. Relationship between magnetic state and characteristic temperature. Graphs. 16 ref. (P16)

391-P. (Russian.) Investigation of the Hysteresis Loop of Deformed Nickel at Low Temperatures. M. A. Grabovskii. "Uchenye Zapiski. Vypusk 134. Fizika. Kniga Piataia" (Scientific Records. Vol. 134. Physics, Vol. 5), Lomonsov's Moscow State University, 1949, p. 31-55.

Ni was deformed by tension, torsion, and bending. Magnetic properties were determined with respect to extent of deformation and to testing temperature. Test data are charted. 35 ref. (P16, Ni)

392-P. (Russian.) The Equivalent Action of a Circular Magnetic Field and the Drawing Load on the Longitudinal Magnetization of Nickel Wire. M. A. Grabovskii and G. M. Liakhov. "Uchenye Zapiski. Vypusk 134. Fizika. Kniga Piataia" (Scientific Records. Vol. 134. Physics, Vol. 5), Lomonsov's Moscow State University, 1949, p. 56-62.

A study was made of the magnetic anisotropy of Ni wire and its causes. The interrelationship of natural magnetic anisotropy and of anisotropy induced by external forces was determined. Data are charted. 20 ref. (P16, Ni)

393-P. (Russian.) Investigation of Certain Rapid Processes in Iron During an Aperiodic Change of the Field. R. V. Telesnin. "Uchenye Zapiski. Vypusk 134. Fizika. Kniga Piataia" (Scientific Records. Vol. 134. Physics. Vol. 5), Lomonsov's Moscow State University, 1949, p. 63-92.

A study was made of the rate of magnetization and of demagnetization of iron in toroids, wires, and foils. Hysteresis loops for various conditions. 26 ref. (P16, Fe)

394-P. (Russian.) Eddy Currents in Non-Magnetic, Metallic Cylinders and Plates. R. V. Telesnin. "Uchenye Zapiski. Vypusk 134. Fizika. Kniga Piataia" (Scientific Records Vol. 134. Physics. Vol. 5), Lomonsov's Moscow State University, 1949, p. 93-99.

A theoretical discussion. Results of experiments on Cu, Al, brass, and Zn specimens. (P16, Cu, Al, Zn)

395-P. (Russian.) Investigation of the Heat Capacity of Low Melting Metals in the Solid and Liquid States. G. M. Bartenev. "Uchenye Zapiski. Vypusk 134. Fizika. Kniga Piataia" (Scientific Records. Vol. 134. Physics. Vol. 5), Lomonsov's Moscow State University, 1949, p. 113-125.

An experimental study for Sn and Pb of high purity. Data are tabulated and charted. 37 ref. (P12, Sn, Pb)

396-P. (Russian.) Heat Capacity of Tin and Lead Alloys. G. M. Bartenev. "Uchenye Zapiski. Vypusk 134. Fizika. Kniga Piataia" (Scientific Records. Vol. 134. Physics. Vol. 5), Lomonsov's Moscow State University, 1949, p. 126-133.

Three Pb-Sn alloys were investigated; 38% Pb, 62% Sn; 72.4% Pb, 27.6% Sn; and 89.9% Pb, 10.1% Sn. Data are charted. (P12, Pb, Sn)

397-P. The Heat Capacity of Nickel From 15 to 300° K.; Entropy and Free Energy Functions. R. H. Busey and W. F. Giauque. *Journal of the American Chemical Society,* v. 74, June 20, 1952, p. 3157-3158.
(P12, Ni)

398-P. Specific Heat of Germanium Between 20° K. and 200° K. I. Estermann and J. R. Weertman. *Journal of Chemical Physics,* v. 20, June 1952, p. 972-976.

High-precision measurements were carried out between 20 and 200° K. Three samples of Ge were investigated: an extremely pure sample, one of intermediate purity, and one with an addition of 0.006 at. % Al. Graphs and tables. (P12, Ge)

399-P. Influence of the Impurities in the Foil, Electrolyte and Paper in the Electrolytic Capacitor. Gaston Muriset. *Journal of the Electrochemical Society,* v. 99, July 1952, p. 285-288.

Effect on the leakage current. Anode material considered is Al of different purities. Graphs. 12 ref. (P15, T1, Al)

400-P. Production of Nickel Carbide by Decomposition of n-Hexane on Metallic Nickel. A. Cimino and G. Parravano. *Journal of Physical Chemistry,* v. 56, June 1952, p. 706-707.

Additional data on the formation and properties of low-temperature metal carbides. Graphs and tables. (P13, Ni, C-n)

401-P. Sorption of Gases on Metal Powders and Subsequent Change in Metal Reactivity at Room Temperature. Hung Li Wang and Norman Hackerman. *Journal of Physical Chemistry,* v. 56, June 1952, p. 771-774.

The amounts of Cl_2, NO_2, O_2 and CO taken up by powders of stainless steel, Ni, and Mo were measured at room temperature. Reactivities of metal powders, in terms of H_2 evolution in dilute-acid solutions in the absence of air, were determined for reduced stainless steel, Ni and Cr powders when they were bare, with CO adsorbed, or when covered with sorbed oxygen. Graphs and tables. (P13, SS, Ni, Mo, Cr)

402-P. Inelastic Scattering of Protons From Nickel. Ralph Ely, Jr., A. J. Allen, J. S. Arthur, R. S. Bender, H. J. Hausman, and E. M. Reilley. *Physical Review,* ser. 2, v. 86, June 15, 1952, p. 859-860.

Energy levels in Ni were observed at 90°. 20 levels are reported. Energy spectra and tables. (P10, Ni)

403-P. Magnetostrictive Vibration of Prolate Spheroids. Ni-Fe and Ni-Cu Alloys. J. S. Kouvelitest and L. W. McKeehan. *Physical Review,* ser. 2, v. 86, June 15, 1952, p. 898-904.

A study of different magnetic properties determined from the magnetostrictive vibrational behavior of small ferromagnetic prolate spheroids was extended to a large number of Ni-Fe (88, 84, 79, 68, 56, and 45 at. % Ni) and Ni-Cu (90, 84, 81, and 71 at. % Ni) alloys. Results for plain-annealed and magnetic-annealed specimens. A 68% Ni Permalloy was investigated in cold worked, baked, and annealed conditions. Graphs and tables. 11 ref. (P16, Ni, Fe, Cu)

404-P. Gyromagnetic Effect in a Superconductor. R. H. Pry, A. L. Lathrop, and W. V. Houston. *Physical Review,* ser. 2, v. 86, June 15, 1952, p. 905-907.

The gyromagnetic ratio of a superconducting tin sphere was measured by the Einstein-DeHaas method. The result is approximately that to be expected on the picture of perfectly free superconducting electrons and is in agreement with the work of Kikoin and Gubar. Apparatus diagram and graph.
(P15, Sn)

405-P. Radioactivities of Platinum and Iridium From Photonuclear Reactions in Platinum. Darleane Christian, Russel F. Mitchell, and Don S. Martin, Jr. *Physical Review,* ser. 2, v. 86, June 15, 1952, p. 946-950.

The products of photonuclear reactions induced in Pt by a 70-Mev. synchrotron X-ray beam were studied. No Os activities were found. The Ir fraction included two new isotopes. Relative yields of all radioactive isotopes were measured. Graphs. 14 ref. (P13, Pt, Ir, Os)

406-P. Comparison of Magnetoelastic Energy Losses and Magnetic Hysteresis in Ferromagnetic Materials. G. Bonfiglioli, A. Ferro, and G. Montalenti. *Physical Review,* ser. 2, v. 86, June 15, 1952, p. 959-961.

Compares values of losses in mechanical and magnetic hysteresis loops when the alteration (disregarding the sign) of domain structure produced by magnetic field or by mechanical stress is the same. Materials dealt with are Ni, alloy steel, carbon steel, pure annealed iron, and Armco iron. Table and graphs. 10 ref.
(P16, Ni, AY, CN, Fe)

407-P. Relative Pair Production Cross Sections in the Energy Region 50 to 300 Mev. C. R. Emigh. *Physical Review,* ser. 2, v. 86, June 15, 1952, p. 1028-1035.

A cloud-chamber survey was made of pairs produced in Al, Ag, Au, and Th foils by an X-ray beam from the 300-Mev. betatron. By comparing the pairs produced in two of the foils mounted to intercept the same X-ray beam, values of relative pair production cross sections for Ag to Al, Au to Al, and Th to Al were found. Graphs and apparatus diagram. 12 ref.
(P10, Al, Ag, Au, Th)

408-P. The Junction Transistor. Morgan Sparks. *Scientific American,* v. 18*l*, July 1952, p. 29-32.

An account of underlying principles and present state of development of one of two forms of a device that amplifies electricity by the flow of electrons in a crystal. Chiefly deals with germanium. Diagrams. (P15, T1, Ge)

409-P. (French.) **The Sign of the Thermo-Electric Electromotive Force of Silicon.** Jean Savornin and France Fourrier-Savornin. *Comptes Rendus hebdomadaires des Séances de l'Academie des Sciences,* v. 234, May 26, 1952, p. 2165-2167.

Experimental arrangement leading to the finding that contrary to theoretical expectations, Si is thermo-electrically positive. Bismuth was found to be the most simple negative body. (P15, Si, Bi)

410-P. (German.) **Measurement of Instantaneous Induction Values and Field Strengths, and of Magnetic Reversal Losses, of Electrical Sheets.** Willi Krug. *Archiv für das Eisenhüttenwesen,* v. 23, May-June 1952, p. 207-215.

Theoretical basis and construction of ferrometer, and its application to above measurements. The quality of the instrument is evaluated on the basis of the results. Graphs and diagrams. (P16, ST)

411-P. (English.) **Sorption of Gases on Metal Films.** F. C. Tompkins. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 360-363.

Mechanisms of sorbtion and methods for its study, with emphasis on catalytic effects. (P13)

412-P. (German.) **The Surface Condition of Copper Between 500 and 850° C.** F. Erdmann-Jesnitzer and F. Günther. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 386-389; disc., p. 389-390.

On the basis of the experiments, melting of surface layers 10^{-3} to 10^{-4} mm. thick, as described by K. Lichtenecker, is reconsidered. (P12, Cu)

413-P. (German.) **Energy Transmission Mechanism and Rate of Reaction on Metallic Surfaces.** K. Schäfer. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 398-403.

Experiments concerning the relationship between the energy-transmission mechanism to the adsorbed molecules, and their chemical reactions on the surfaces. The method of measurement establishing the thermal accommodation coefficient of ethane on the metallic surfaces of Pt-Cu alloys. Results are interpreted and an explanation of the phenomenon is proposed. Tables and graphs. (P13, Pt, Cu)

414-P. (German.) **Dissociation of Zirconium Iodide on Hot Metal Surfaces.** H. Döring and K. Moliere. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 403-407; disc., p. 407-408.

Measurements of reaction rate of above dissociation by the method of van Arkel and de Boer. Characteristic curve of growth rate with wire and vessel temperature and formation of iodides of lower valence. (P13, Zr)

415-P. (German.) **Electron Emission of a Silver Surface Caused by Iodine.** H. Paproth, W. Rathje, and I. N. Stranski. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 409-413; disc., p. 413-414.

Experiments in which the emission of negative electrons was observed. Dependence of the emission upon voltage and temperature; nature of the emitted electrons. Proposes theory of so-called chemoelectric emission as an explanation for the phenomenon. 13 ref. (P15, Ag)

416-P. (German.) **Heat of Fusion of Aluminum and Germanium.** Franz Eberhard Wittig. *Zeitschrift für Metallkunde,* v. 43, May 1952, p. 158-161.

Proposes improvements in the experimental set-up customary for investigations of heat fusion. The improvement is achieved mainly by using a control device developed by the author. Results achieved by the new method. Tables and diagrams. 13 ref. (P12, Al, Ge)

417-P. (Russian.) **Certain New Laws Connecting Values of Losses to Coercive Force.** N. S. Akulov and T. A. Elkina. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Mar. 21, 1952, p. 377-379.

A theoretical discussion. Conclusions are confirmed by experimental data on cobalt, 45% and 78% Permalloys, Alsifer, and a steel of unspecified composition. (P16, Co, ST, Ni, Fe)

418-P. (Russian.) **The Behavior of Superconducting Films in Magnetic Fields.** V. L. Ginzburg. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Mar. 21, 1952, p. 385-388.

A theoretical discussion. Graphical interpretation. (P15, P16)

419-P. (Russian.) **Magnetization Curves of Plastically Deformed Iron in Strong Fields.** N. S. Akulov and K. M. Bol'shova. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 21, 1952, p. 817-819.

Armco iron and an Fe alloy containing 4% Mo were used in experimental determination. Data are charted. (P16, Fe)

420-P. (Russian.) **Ferromagnetic Resonance in Parallel Wires.** V. K. Arkad'ev and A. G. Kotov. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 21, 1952, p. 821-824.

Iron and nickel wires were used in investigation of the above. Data are charted. (P16, Fe, Ni)

421-P. (Russian.) **Interphase Tension at the Boundary of Unmixed Liquid Metals.** P. V. Gel'd and S. K. Chuchmarev. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 21, 1952, p. 877-880.

The interphase tension between molten Pb and Zn was measured experimentally. Data are tabulated and illustrated. 14 ref. (P10, Pb, Zn)

422-P. (Russian.) **Fluidity of Ferrous Alloys.** N. N. Kurnakov and M. Ia. Troneva. "Izvestiia Sektora Fiziko-Khimicheskogo Analiza", v. 20 (Academy of Sciences of the USSR), p. 66-75.

A study was made of fluidity in the Fe-Si, Fe-P, and Fe-Cr systems. Data are tabulated and charted. 37 ref. (P10, Fe, Si, Cr)

423-P. Surface Losses in Electromagnetic Cavity Resonators. I. Paghis. *Canadian Journal of Physics,* v. 30, May 1952, p. 174-184.

In a study of the relation between surface roughness and resonator losses, effective skin resistance of brass was determined at microwave frequencies, by means of Q measurements. Micrographs, tables, graphs, and apparatus diagrams. 14 ref. (P16, S15, Cu)

424-P. The ABC's of Germanium. J. P. Jordan. *Electrical Engineering,* v. 71, July 1952, p. 619-625.

Germanium is one of the most important elemental semiconductors. Some of the mechanisms governing its behavior are presented in a simplified manner as background for the understanding of the physics of the industrial devices utilizing it. (P15, Ge)

425-P. Absorption of 2-Mev Constant Potential Roentgen Rays by Lead and Concrete. W. W. Evans, R. C. Granke, K. A. Wright, and J. G. Trump. *Radiology,* v. 58, April 1952, p. 560-567.

The Cu absorption curve and the half-value layer in Cu, Pb, and concrete were measured for these supervoltage rays and compared with the closely equivalent, though less intense, gamma rays from radioactive sources. The transmission of 2-million-volt constant potential X-rays through barriers of Pb and concrete was determined for both small and large beams. Absorption characteristics of Al. Graphs and tables. (P10, Pb, Cu, Al)

426-P. Gamma-Ray Absorption Coefficients. Charlotte Meaker Davisson and Robley D. Evans. *Reviews of Modern Physics,* v. 24, Apr. 1952, p. 79-107.

Absorption of radiation in the energy range 0.1-6 Mev. Results of the theories of Compton effect, photo-electric effect, and pair production are given in the form of equations, tables, and curves. Necessary considerations in studying absorption coefficients; results of various workers compared with theory. Concludes that, in this energy range, present theories give values of absorption coefficients which are in good agreement with those obtained experimentally. Includes tabular and graphical data for specific elements, including C, Fe, Al, Cu, Ag, Sn, Ta, Pt, and Pb. 64 ref. (P10)

Q

MECHANICAL PROPERTIES AND TEST METHODS; DEFORMATION

591-Q. Pre-Tensioning for Preventing Fatigue Failure in Bolts. Simple Theory and an Account of Experiments Carried Out at the R. A. E. W. A. P. Fisher, R. H. Cross, and G. M. Norris. *Aircraft Engineering,* v. 24, June 1952, p. 160-163.

A simple elastic theory of reduction of bolt-load fluctuation obtained by deliberate pre-tensioning, and some fatigue tests which establish the principle. The form of joint considered is that for which tensile load is transmitted from one member to another through an axially loaded bolt. Experimental results are given for ¾-in. steel bolts tested in steel and in Al alloy fittings. Tables, graphs, and photographs. (Q7, K13, ST)

592-Q. Report of Joint Committee on Effect of Temperature on the Properties of Metals. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 216-235.

Report on publications and technical papers, research projects, etc., plus two project reports. "Study of Effects of Variables on the Creep Resistance of Steels", H. C. Cross and J. A. VanEcho: Test program intended to determine whether a relationship between Si and Al additions might be used to control the creep resistance of fine-grained carbon steels. Higher than normal Si contents did not produce good creep properties in AISI 1015 Al-treated steels. "Stability of Steels as Affected by Temperature", J. J. Kantner and E. A. Sticha: Graphitization test data on 40 different heats of several low-alloy steels. (Q3, N8, CN, AY)

593-Q. Report of Committee E-9 on Fatigue. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 488-489.

Organizational changes; list of papers screened and accepted; activities of subcommittees. (Q7)

594-Q. The Influence of Surface Roughness on the Fatigue Life and Scatter of Test Results of Two Steels. P. G. Fluck. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 584-591; disc., p. 591-592.

Previously abstracted from Preprint 20. See item 322-Q, 1951. (Q7, CN, AY)

595-Q. Effect of Residual Stress on the Fatigue Strength of Notched Specimens. D. Rosenthal and G. Sines. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 593-608; disc., p. 608-610.

Previously abstracted from Preprint 17. See item 365-Q, 1951. (Q7)

596-Q. Damping, Fatigue, and Dynamic Stress-Strain Properties of Mild Steel. B. J. Lazan and T. Wu. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 649-678; disc., p. 678-681.

Previously abstracted from Preprint 22. See item 467-Q, 1951. (Q7, Q8, CN)

597-Q. Fatigue Strength of Ball Bearing Races and Heat-Treated 52100 Steel Specimens. Haakon Styri. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 682-697; disc., p. 697-700, 719-720.

Previously abstracted from Preprint 23. See item 367-Q, 1951. (Q7, AY)

598-Q. Laboratory Evaluation of Materials for Marine Propulsion Gears. M. R. Gross. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 701-716; disc., p. 716-720.

Previously abstracted from Preprint 38. See item 370-Q, 1951. (Q7, T7)

599-Q. The Fatigue Test as Applied to Lead Cable Sheath. G. R. Gohn and W. C. Ellis. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 721-740; disc., p. 741-744.

Previously abstracted from Preprint 24. See item 368-Q, 1951. (Q7, Pb)

600-Q. The Influence of Frequency on the Repeated Bending Life of Acid Lead. John F. Eckel. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 745-756; disc., p. 757-760.

Previously abstracted from Preprint 25. See item 334-Q, 1951. (Q5, Pb)

601-Q. Compression Tests on Lead Alloys at Extrusion Temperatures. G. M. Bouton and G. S. Phipps. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 761-770; disc., p. 770.

Previously abstracted from Preprint 26. See item 369-Q, 1951. (Q28, Pb)

602-Q. The Influence of Cold Work and Heat Treatment on the Engineering Properties of Beryllium Copper Wire. J. T. Richards, R. K. Levan, and E. M. Smith. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p.771-791.

Electrical conductivity and tension tests were performed on Be-Cu wire to determine influence of cold work, solution treating, and precipitation hardening. Grain size, preferred orientation, straightening, overstraining in tension, and stress-relieving were found to have a marked effect upon tensile strength, proportional limit, ductility, and tension modulus. Method of plotting stress-strain data. (Q27, P15, Cu)

603-Q. Fatigue Tests in Axial Compression. N. M. Newmark, R. J. Mosborg, W. H. Munse, and R. E. Elling. *American Society for Testing Materials, Proceedings.* v. 51, 1951, p. 792-803; disc., p. 804-810.

Preliminary results of an investigation of the behavior of materials subjected to repeated compressive loads. Exploratory studies were conducted on gray cast iron, 24S-T Al alloy, and steel. In general, compressive failures occurred only under high stresses. Results. under nearly uniformly distributed axial compressive loads, are in distinct contradiction to those obtained with notched specimens or with repeated bending tests. (Q7, CI, Al, ST)

604-Q Prediction of Relaxation of Metals From Creep Data. Irving Roberts. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 811-825; disc., p. 826-831.

Previously abstracted from Preprint 37. See item 338-Q, 1951. (Q3)

605-Q. Mechanical Properties in Torsion and Poisson s Ratio for Certain Stainless Steel Alloys. C. W. Muhlenbruch, V. N. Krivobok, and C. R. Mayne. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 832-852; disc., p. 853-856.

Modulus of elasticity in shear, shearing yield strength, and Poisson's ratio were studied for a number of AISI 300 stainless steels. Values for secant shearing modulus of elasticity and yield strength at a limiting amount of torsional strain are given. Reasons for behavior are based on analysis of stress-strain relationships, susceptibility to work hardening, and state of stress in the material when subjected to axial loading. A theoretical relationship between Poisson's ratio and secant moduli in tension and shear. (Q21, Q1, SS)

606-Q. Creep-Rupture of Several Sheet Steels. G. V. Smith, E. J. Dulis, and E. G. Houston. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 857-868; disc., p. 868.

Grips for testing sheet or strip in creep-rupture. Experimental results reported for annealed 18 Cr, 8 Ni (Mo) at 1100, 1300, and 1500° F.; annealed and half-hard 17 Cr, 7 Ni at 600 and 1100° F.; and cold-rolled 4608 (Ni, Mo) at 600° F. (Q4, SS, AY)

607-Q. Notch Toughness of Four Alloy Steels at Low Temperatures. W. B. Seens, W. L. Jensen, and O. O. Miller. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 918-928; disc., p. 929-930.

Steels containing nominally 2.5% Ni, 3.5% Ni, 3.5% Ni and 0.25% Mo and 9% Ni were investigated. Charpy impact specimens with keyhole notch were taken from ½-in. plates and from 2-in. plates of all four steels and from 0.24-in. or 0.30-in. tubing of 2317 and 2810 steels. (Q23, AY)

608-Q. Notch-Toughness of Fully Hardened and Tempered Low-Alloy Steels. R. L. Rickett and J. M. Hodge. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 931-944.

Previously abstracted from Preprint 31. See item 335-Q, 1951. (Q6, AY)

609-Q. Creep Properties of Two Tempers of 63S Extruded Aluminum Alloy. O. D. Sherby and J. E. Dorn. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 945-953; disc., p. 977-980.

Previously abstracted from Preprint 34. See item 337-Q, 1951. (Q3, Al)

610-Q. Effect of Annealing on the Creep Properties of 2S-O Aluminum Alloy. O. D. Sherby and J. E. Dorn. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 954-963; disc., p. 977-980.

Effect of stabilizing anneals at 650, 950, and 1150° F. were investigated. Large grains were produced by the 1150° F. treatment, but the other two annealing temperatures produced no grain growth and were essentially recovery treatments. Creep rate decreased with increasing temperatures of anneal, irrespective of grain size, within the ranges of stress and temperature investigated. (Q3, J23, Al)

611-Q. The Creep Properties of Some Forged and Cast Aluminum Alloys. O. D. Sherby, T. E. Tietz, and J. E. Dorn. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 964-976; disc., p. 977-980.

Previously abstracted from Preprint 33. See item 336-Q, 1951. (Q3, Al)

612-Q. Creep Characteristics of Phosphorized Copper (0.019 Per Cent) at 300, 400, and 500 F. A. I. Blank and H. L. Burghoff. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 981-993; disc., p. 993-995.

Previously abstracted from Preprint 35. See item 468-Q, 1951. (Q3, Cu)

613-Q. Mechanical Properties of Copper at Various Temperatures. W. H. Munse and N. A. Weil. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 996-1019; disc., p. 1019-1022.

Results at temperatures from −321 to 400° F. Values of yield strength, ultimate strength, reduction of area, elongation, and modulus of elasticity. Three types of base material were studied: electrolytic tough-pitch Cu, deoxidized high-phosphorus Cu, and oxygen-free high-conductivity Cu. A supplementary series of tests was conducted on cold rolled, deoxidized, high-phosphorus Cu between −321 and 1200° F. Results are correlated with those reported in the literature for the same and similar materials. (Q general, Cu)

614-Q. Rheotropic Brittleness: General Behaviors. E. J. Ripling and W. M. Baldwin, Jr. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 1023-1030; disc. p. 1031-1037.

Previously abstracted from Preprint 39. See item 371-Q, 1951. (Q23, Zn)

615-Q. An Arbitration Bar Izod Impact Test for Cast Iron. J. T. Eash and A. P. Gagnebin. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 1061-1068; disc., p. 1068-1071.

Previously abstracted from Preprint 15. See item 364-Q, 1951. (Q6, CI)

616-Q. The Constancy of Calibration of Elastic Calibration Devices. W. C. Aber and F. M. Howell. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 1072-1084; disc., p. 1084-1086.

Devices used for calibrating testing machines throughout the Aluminum Co. of America, and their calibrations by the National Bureau of Standards. Importance of using dial indicators that will repeat readings within narrow limits. (Q general)

617-Q. Effect of Speed of Testing on the Tensile Properties of Copper and Copper-Base Alloys. N. H. Murdza. *American Society for Testing Materials,* Preprint 11a, 1952, 16 pages.

Results of a series of tests made by various government (both U. S. and Canadian) and industrial testing laboratories to show effect of speed on yield strength, tensile strength, and elongation of Cu and free-cutting brass rod. (Q27, Cu)

618-Q. Load-Deflection Relationships in Slow-Bend Tests of Charpy

V-Notch Specimens. R. Raring. *American Society for Testing Materials,* Preprint 65, 1952, 16 pages.

Load-deflection diagrams of slow-bend tests, at temperatures through the transition range of Charpy V-notch specimens of quenched and tempered and of pearlitic steels containing 0.01-0.63% and having tensile strengths of 48,000-152,000 psi. Characteristics of the diagrams and of development of the crack. Results are compared, on the basis of energy absorbed and of transition temperature, with those of impact tests of the same steels. Some correlation between slow notch-bend tests and tension tests is shown. (Q5, CN)

619-Q. An Inquiry Into the Reproducibility of Impact Test Results. H. L. Fry. *American Society for Testing Materials,* Preprint 67, 1952, 4 pages.

Study consisted mainly of performing a large number of comparative tests on C-1020 and 4340 steels on five impact machines, with all variables controlled as closely as possible. Most of the work was done on keyhole-notch Charpy specimens, but Izod and V-notch Charpy specimens also studied. Tables and graphs. (Q6, CN, AY)

620-Q. Rheotropic Embrittlement. E. J. Ripling. *American Society for Testing Materials,* Preprint 73, 1952, 6 pages.

The ductility deficiency exhibited by metals not crystallizing in the face-centered cubic system, when these metals are strained at low temperatures, high strain rates, or in the presence of hydrostatic tension, has recently been shown to be partially strain curable. The portion of this embrittlement which can be overcome by prestrain under some ductile conditions has been labeled "rheotropic embrittlement." Reviews recent literature on influence of variables which affect rheotropic behavior. Graphs. (Q23)

621-Q. Report on ASTM Task Group for Determination of Elastic Constants. Walter Ramberg. *American Society for Testing Materials,* Preprint 158, 1952, 7 pages.

Task Group mission was "to survey the work done in determining the elastic constants of materials and to recommend suitable methods for determination of elastic moduli". Results of questionnaire are charted, tabulated, and show the need for better methods of determining elastic constants of metals at elevated temperatures and of nonmetals at all temperatures below the softening temperature. (Q21)

622-Q. The Influence of Temperature on the Elastic Constants of Some Commercial Steels. F. Garofalo, P. R. Malenock, and G. V. Smith. *American Society for Testing Materials,* Preprint 159, 1952, 18 pages.

Elastic moduli in tension and in shear were determined at various temperatures between 75 and 1500° F. for 21 commercial steels, both carbon and alloyed. Very good agreement was found between the data obtained and results, determined both statically and dynamically, reported by other investigators. 20 ref. (Q21, ST)

623-Q. Influence of the Volume Fractions of the Phases on the Deformation of ($\alpha + \beta$) Brass. L. M. Clarebrough and G. R. Porger. *Australian Journal of Scientific Research,* ser. A, v. 5, Mar. 1952, p. 114-118.

Relative deformations of the phases were studied, after 20, 40, 60, and 80% reductions in area by wire-drawing in duplex brasses of various compositions, using as a measure of degree of deformation the temperature at which recrystallization began. Mode of recrystallization of the phases varied with the degree of deformation and volume proportion of the phases. (Q24, N5, Cu)

624-Q. Castings to Resist Abrasive Wear. E. J. Brown. *Foundry Trade Journal,* v. 92, June 5, 1952, p. 587-595.

Contains a general discussion of wear. Shows how Mn steel as well as Ni-Cr alloy cast irons and other alloy steels have been developed to meet a number of service conditions. Manufacturing methods and applications for these materials. Flame hardening, nitriding, surface deposits of abrasion resisting material, heat treatment of Mn steel and alloy cast iron, and work hardening of steel. Photomicrographs, graphs, diagrams, and photographs. (Q9, J general, CI, AY, ST, SG-m)

625-Q. Nucleation and Growth of Flow and Fracture Markings. Waller George. *Industrial and Engineering Chemistry,* v. 44, June 1952, p. 1328-1331.

Macroscopic observations of the temporal and spatial development of localized plastic flowing and fracturing in polymeric solids (and metals) are used to suggest "models" of the physical character of the microscopic processes of plastic flow. Nature of delayed yielding in metals and polyamides. Advance nucleation of macroscopic flow and fracture elements in the region of stress concentration in advance of the primary flow or fracture event. This effect is illustrated in the growth of fatigue fractures, creep fracture, horizontal flow markings, or craze cracks. Fracture pairs and showers are illustrated. 33 ref. (Q24, N2)

626-Q. Wear of Fuel Injection Equipment and Filtration of Fuel for Compression-Ignition Engines. A. E. W. Austen and B. E. Goodridge. *Institution of Mechanical Engineers, Proceedings,* (Automobile Div.), pt. 3, 1950-1951, p. 85-95; disc., p. 95-104.

Dependence of wear of fuel-injection equipment on abrasive-particle size. Mechanism of wear; properties of filters; nature and particle sizes of solids in fuels; effect of filters in reducing abrasive wear; review of service experience with current filters; choking properties of filter materials; and a hypothesis of the choking mechanism. Graphs, diagrams, tables, interference and other photomicrographs. (Q9)

627-Q. Cutting Tools: Microhardness Testing May Show Road to Better Tool Results. *Iron Age,* v. 169, June 19, 1952, p. 184-185.

The method and two applications: on high speed steel, and for carbides in high speed steel. (Q29, TS, C-n)

628-Q. On the Direction of Fatigue Cracks in Polycrystalline Ingot Iron. F. A. McClintock. *Journal of Applied Mechanics,* v. 19, *(Transactions of the American Society of Mechanical Engineers,* v. 74), Mar. 1952, p. 54-56.

A statistical analysis is developed to show how a microscopic shear failure can result in the apparent tensile failure of polycrystalline iron in rotary bending fatigue tests. For comparison with theory, 12 Moore-type specimens of ingot iron were run at 27,000 psi and examined. 10 ref. (Q7, Fe)

629-Q. The Theoretical Analysis of Metal-Forming Problems in Plane Strain. E. H. Lee. *Journal of Applied Mechanics,* v. 19, *(Transactions of the American Society of Mechanical Engineers,* v. 74), Mar. 1952, p. 97-103.

Plastic flow in plane strain of an ideally plastic material subjected to large strains. Elastic strains are negligible and a rigid-plastic type of analysis is adopted. Indicates errors in solutions in the literature based on stress equations only. Includes appendix on determination of plastic-rigid boundary. 26 ref. (Q24)

630-Q. Statistical Design of Fatigue Experiments. Waloddi Weibull. *Journal of Applied Mechanics,* v. 19, *(Transactions of the American Society of Mechanical Engineers,* v. 74), Mar. 1952, p. 109-113.

An analytical expression connecting fatigue lives with applied stresses, and methods for computing the values of its parameters from experimental data. Formulas for estimating the uncertainty of computed parameter values are deduced. Testing time and costs may be reduced by more than 40% using the formulas. Example for pulsating tensile fatigue tests on Al alloy 75S. Graphs and tables. (Q7, Al)

631-Q. Effect of Temperature on the Tensile Properties of High-Purity Nickel. William D. Jenkins and Thomas G. Digges. *Journal of Research of the National Bureau of Standards,* v. 48, Apr. 1952, p. 313-324.

Tension tests were made at temperatures from −320 to 1500° F. on annealed high-purity Ni. Exceptions to the usual trend of decreasing strength and increasing ductility with increasing test temperatures were observed. (Q27, Ni)

632-Q. Fatigue of Aircraft Materials With Special Reference to Microstructure. P. L. Teed. *Journal of the Royal Aeronautical Society,* v. 56, June 1952, p. 427-437.

A general discussion of microstructure illustrated by photomicrographs, followed by a consideration of effect of microstructure on fatigue. A variety of metals and alloys are mentioned. Graphs and tables. (Q7, M27)

633-Q. Magnesium-Rare Earth Alloys. J. C. McDonald. *Machine Design,* v. 24, June 1952, p. 260, 262, 264.

See abstract of "Use of Rare Earth Metals in Magnesium Casting Alloys," *Light Metal Age;* item 109-Q, 1952. (Q general, E25, Mg, SG-h)

634-Q. European Research on the Behavior of Metals Yields Promising Results. Thomas J. Dolan. *Materials & Methods,* v. 35, June 1952, p. 93-96.

Unusual testing methods used to determine design criteria and especially to study the nature of fatigue and creep. Work on experimental stress analysis is included. Observations were made in England, Scotland, Switzerland, and Sweden. (Q7, Q3)

635-Q. Softening Induced by Cold Working. *Metal Progress,* v. 67, June 1952, p. 122, 124, 126-128, 140. (Condensed from "Softening of Metals During Cold Working", N. H. Polakowski.)

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 154-Q, 1952. (Q24, N5, Cu, Ni, Al, ST)

636-Q. Redefinition of "Strength of Materials". *Metal Progress,* v. 67, June 1952, p. 140, 142, 144. (Condensed from "A New Version of 'Strength of Materials' ", A. C. Vivian.)

Previously abstracted from *Metallurgia.* See item 238-Q, 1952. (Q23, M25, M26)

637-Q. Creep Properties of Solution Treated N-155. *Metal Progress,* v. 67, June 1952, p. 148, 150, 152, 154. (Condensed from "Fundamental Effects of Aging on Creep Properties of Solution Treated Low-Carbon N-155 Alloy", D. N. Frey, J. W. Freeman, and A. E. White.)

Previously abstracted from *National Advisory Committee for Aeronautics,* Technical Report 1001, 1950. See item 743-Q, 1951. (Q3, SS)

638-Q. High-Temperature Aluminum Alloy. *Metal Progress,* v. 67, June 1952, p. 162, 164, 166. (Condensed from "A Mischmetal Aluminum Alloy for Elevated Temperature Service", B. M. Loring, W. H. Baer, and C. G. Akerlind, *Naval Research Laboratory,* Report 3871, Nov. 1, 1951.)

An alloy of Al and mischmetal (50% Ce and the rest the other rare earths, including La) was found to have considerable promise as a high-temperature alloy in comparison with conventional age hardening Al alloys. Mechanical-test data are tabulated and charted. Melting procedure to avoid segregation. (Q general, E25, Al, EG-g)

639-Q. Friction and Surface Damage of Several Corrosion-Resistant Materials. Marshall B. Peterson and Robert L. Johnson. *National Advisory Committee for Aeronautics,* Research Memorandum E51L20, Feb. 20, 1952. 20 pages.

An investigation was made in air, of friction and surface damage of several materials resistant to corrosion by liquid metals. Values of kinetic friction coefficient at low sliding velocities and photomicrographs of surface damage were obtained. Appreciable surface damage was evident for all materials tested except tungsten carbide. (Q9, ST, SS, Ni, W, C-n)

640-Q. Effect of Open Circular Holes on Tensile Strength and Elongation of Sheet Specimens of a Magnesium Alloy. R. S. Barker. *National Advisory Committee for Aeronautics,* Technical Note 2716, June 1952, 24 pages.

Data tabulated, charted, and discussed. 10 ref. (Q27, Mg)

641-Q. Fatigue and Static Tests of Flush-Riveted Joints. Darnley M. Howard and Frank C. Smith. *National Advisory Committee for Aeronautics,* Technical Note 2709, June 1952, 38 pages.

Fatigue tests at zero mean load were made on 190 multiple-rivet joints having ⅛-in. diameter A17S-T3 100° countersunk-head rivets. Both butt and lap joints were tested. Static tests were made on 34 typical joints. The sheet materials used were 0.032-in. bare and Alclad 75S-T6, 0.032-in. bare and Alclad 24S-T3, and 0.064-in. Alclad 75S-T6. Apparatus and results. (Q7, K13, Al)

642-Q. "Elastic" and "Plastic" Hardness of Hard Materials. P. Grodzinski. *Nature,* v. 169, May 31, 1952, p. 925-926.

Method for measuring hardness based on application of a thin evaporated Ag layer to the matrix surface. Materials tested include boron and silicon carbide, synthetic corundum, and diamond. Graph and table. (Q29, C-n)

643-Q. Influence of Structure on the Plastic Flow of Steel Above the A$_1$ Point. P. Feltham. *Nature,* v. 169, June 7, 1952, p. 976.

Study of the relationship between temperature and flow-rate of steel at a given stress. Results of experiment shown graphically. (Q24, ST)

644-Q. Remotely-Operated Impact Tester. W. Pate, E. Hutto, and E. Marguerat. *Nucleonics,* v. 10, June 1952, p. 60.

Remote operation of an impact tester, handling radio-active test specimens through a 3-ft. wall. (Q6)

645-Q. Critical Shear Stresses in Body-Centered Cubic Lattices. R. Smoluchowski. *Physical Review,* ser. 2, v. 86, June 1, 1952, p. 787-789.

Shows how a consideration of shape and atomic configuration of dislocations in a body-centered cubic lattice allows an estimate of the ratio of critical shear stresses on various slip planes as a function of temperature. Table showing relative values of critical shear stresses of Cu, Zn and Fe. (Q2, Cu, Zn, Fe)

646-Q. The Influence of Electrolytes on the Mechanical Properties of Certain Metal Single Crystals. E. N. da C. Andrade and R. F. Y. Randall. *Proceedings of the Physical Society,* v. 65, sec. B, June 1, 1952, p. 445-454.

Shows that the contact of electrolytes has a marked effect on the mechanical behavior of single crystals of Cd and Zn which have been exposed to the air. 10 ref. (Q general, Cd, Zn)

647-Q. Smooth Surfaces Don't Always Give Least Wear. *SAE Journal,* v. 60, June 1952, p. 57-60; disc., p. 60. (Excerpts from "Surface Finish—Its Effect on Wear", by C. R. Lewis.)

Research studies show that smooth surfaces wear more slowly than rough ones under ideal laboratory conditions. However, in applying the results to production machinery, it is necessary to exercise considerable caution. In many cases, fits of wearing surfaces are seldom those envisaged by designers, and best results are obtained by allowing some initial roughness. Effects of secondary influences. Graphs. (Q9)

648-Q. What Can Be Learned From the Hardness Test. Part II. Howard E. Boyer. *Steel Processing,* v. 38, June 1952, p. 280-285, 298-299.

Common errors in hardness testing operations: design of suitable supporting structures; use of different indenters; brands of hardness testers; and microhardness testing. Diagrams, photographs; and photomicrographs. (Q29, TS, Al)

649-Q. A New High-Yield-Strength Alloy Steel for Welded Structures. L. C. Bibber, J. M. Hodge, R. C. Altman, and W. D. Doty. *Transactions of the American Society of Mechanical Engineers,* v. 74, Apr. 1952, p. 269-284; disc., p. 284-285.

Development, metallurgical characteristics, welding and gas-cutting characteristics, low - temperature toughness, applications, and engineering potentialities of USS "Carilloy" steel designated "T-1" is characterized by yield strength levels of 100,000 psi. and above. At these high strengths, it retains its toughness to much lower temperatures than ordinary structural steels. In addition, welds which develop the full strength of the base metal can be made without preheating or postheating. (Q23, K general, AY)

650-Q. Fatigue Tests of Piping Components. A. R. C. Markl. *Transactions of the American Society of Mechanical Engineers,* v. 74, Apr. 1952, p. 287-299; disc., p. 299-303.

Compilation of available fatigue-test data on steel piping components. Stress-intensification factors relative to straight pipe are derived. Suggests empirical correlations by which application of the available data can be expanded to a wider range of sizes and conditions. 14 ref. (Q7, ST)

651-Q. Peculiar Behavior of Steel Beams Under Dead Loads That Produce Inelastic Strains. H. T. Corten, M. E. Clark, and O. M. Sidebottom. *Transactions of the American Society of Mechanical Engineers,* v. 74, Apr. 1952, p. 349-354.

Investigation was undertaken to determine effect of testing members under dead load where each increment of load could be maintained on the member a sufficient length of time until equilibrium was attained. Five statically determinate beams, four mild-steel beams of various cross sections, and one rail-steel rectangular beam were tested in a dead-load testing machine. Load-deformation diagrams were found to have a stairstep appearance, unlike the smooth continuous curves usually reported. Ultimate load-carrying capacity of the mild-steel beams was found to be considerably below that predicted by theory. (Q23, CN)

652-Q. An Experimental Investigation of Over-Straining in Mild-Steel Thick-Walled Cylinders by Internal Fluid Pressure. M. C. Steele and John Young. *Transactions of the American Society of Mechanical Engineers,* v. 74, Apr. 1952, p. 355-361; disc., p. 361-363.

Mechanism of yielding was studied and strains observed at the bore and outside surfaces of mild steel cylinders of 2:1 diameter ratio under internal fluid pressure were compared with plastic theories. Observations disagree with theoretical assumptions concerning the progression of yielding. (Q23, CN)

653-Q. Dynamic Properties of Nodular Cast Iron. Part I. Harry Majors, Jr. *Transactions of the American Society of Mechanical Engineers,* v. 74, Apr. 1952, p. 365-375; disc., p. 376-380.

Results of investigation on mechanical properties of Mg-treated nodular cast iron in the annealed and as-cast condition. Dynamic stress-concentration factors are compared with Neuber's theoretical factors for hyperbolic notches, with Peterson's results on steel, with Frocht's photo-elastic results, and with Grant's data on flake cast iron and Ce-treated nodular iron. Fatigue results are shown for square and 45° V notches at 200 and 6000 r.p.m., as well as for various notch depths. Static damping capacities are compared with torsional damping capacities. 30 ref. (Q general, CI)

654-Q. Relaxation of Stress in a Heat-Exchnager Tube of Ideal Material. E. A. Davis. *Transactions of the American Society of Mechanical Engineers,* v. 74, Apr. 1952, p. 381-385.

Analytical solutions of the relaxation of an elasticoviscous tube in a rigid tube sheet in both plane stress and modified plane strain are worked out. Effect of reloading tensile specimens in relaxation; results of tests on an Al alloy illustrate these effects. (Q3, Al)

655-Q. Strain-Hardening and Softening With Time in Reference to Creep and Relaxation in Metals. A. Nadai. *Transactions of the American Society of Mechanical Engineers,* v. 74, Apr. 1952, p. 403-413.

Analytical expressions are formulated for describing influence of strain hardening, of time rate of change of flow resistance, and of recovery strains on creep and relaxation of metals under uniaxial stress. (Q3)

656-Q. A Critical Review of the Criteria for Notch-Sensitivity in Fatigue of Metals. C. S. Yen and T. J. Dolan. Engineering Experiment Station, University of Illinois, Bulletin Series 398, Mar. 1952, 55 pages. (*University of Illinois Bulletin,* v. 49, No. 53.)

Includes graphs. 54 ref. (Q7)

657-Q. Nitrogen Content and Low-Temperature Brittleness of Steel. *Welding Journal,* v. 31, June 1952, p. 474-475. (Condensed from "Influence of Nitrogen on the Notch Toughness at Low Temperatures of Heat-Treated 0.3 Percent Carbon Steel," G. W. Geil, N. L. Carwile, and T. G. Digges.)

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 538-Q, 1952. (Q23, CN)

658-Q. Stress Concentrations in Steel Under Cyclic Load. E. Orowan. *Welding Journal,* v. 31, June 1952, p. 273s-282s.

Behavior of stress concentrations in ductile bodies under cyclic load

with particular reference to steel pressure vessels. Influence of local plastic yielding on final stress range at a stress peak; progressive change of stress and strain cycles in the plastic surface layers of a rod in alternating bending; progressive change of local stress and strain amplitudes in general cyclic bending, and in repeated bending; the Bauschinger effect; other cases of stress inhomogeneity; connection with the physical theory of fatigue; observed fatigue behavior of bent and notched specimens; fatigue at high stress amplitudes; local strain hardening during the pressure test; and effect of strain aging. Schematic diagrams. (Q24, Q5, Q7, ST)

659-Q. (Dutch.) **Fatigue Testing at the T. N. O. Metals Institute.** F. H. Toneman. *TNO Nieuws*, v. 7, May 1952, p. 142-146.

Types of fatigue testing and operation of the 100-ton apparatus. Photographs and a chart. (Q7)

660-Q. (French.) **Relationship Between Tensile and Creep Strains and Recrystallization.** B. Jaoul and C. Crussard. *Metallurgia Italiana*, v. 44, May 1952, p. 175-179.

During a study of the shape of tensile strength curves of several Al alloys, a snarp break in the plastic deformation curves was found to exist. Formulas represent the two portions of the curve. The transition point between the two types of deformation corresponds to the beginning of fracture of the grains. Creep tests on the same alloys show that stress corresponding to the beginning of fracture has approximately the same value as creep limit. Concludes that creep cannot occur until grain fracture begins. From exact analysis of the stress curves, approximate values of creep limit and critical recrystallization point may be determined. Graphs. 13 ref. (Q23, Q3, Al)

661-Q. (French.) **Influence of Thermal Treatment on Tensile-Stress Curves of Mild Steel.** P. Bastien and C. Winter. *Revue de Métallurgie*, v. 49, May 1952, p. 328-337; disc., p. 338.

Mild steels of various composition were studied. Influence of thermal treatment on plasticity moduli, and the experimental set-up. Data are tabulated and charted. Test specimens are illustrated. (Q27, CN)

662-Q. (German.) **Research on Cast Aluminum Alloys for Cylinder Heads.** H. Vosskühler. *Aluminium*, v. 28, Apr. 1952, p. 99-106.

High-temperature tensile and creep tests on a series of 18 Al alloys, compositions of which are tabulated. The one found to be best is called "Hy-511". It contains 5% Mg, 1% Si, and small amounts of Mn, Fe, and Ti. Its thermal conductivity increases more rapidly with temperature than that of other alloys, which is desirable for cylinder heads. Tables and graphs. 16 ref. (Q27, Q3, P11, Al)

663-Q. (German.) **The New Light-Metal Bearing Alloy, K-4.** A. Rühenbeck. *Metall*, v. 6, June 1952, p. 291-298.

Fundamentals of the metallurgy of bearing metals; properties of the "K-4" Al-Zn-Mg bearing alloy, its testing, further developments, and economic considerations. Micrographs and macrographs illustrate structures of different bearing alloys. Comparative properties are tabulated and charted. (Q general, M27, Al, SG-c)

664-Q. (German.) **Metals and Insulating Materials—a Comparison.** W. Späth. *Metall*, v. 6, June 1952, p. 305-307.

Compares some mechanical and physical test results for rubbers and plastics with corresponding data for metals. Similarities and differences. (Q general, P general)

665-Q. (German.) **Mechanics of Materials.** E. Siebel. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, June 1, 1952, p. 465-471.

The mechanical behavior of crystalline materials under tensile stress can be ascribed to the interaction between shear strength and slip, flow, and fracture resistances. Thermal motion of the atoms reduces slip resistance and coherence of the material. D.fferences of effects of tension and compression under alternating stress. Photographs, diagrams, and graphs. 13 ref. (Q24)

666-Q. Strain Ageing: A Survey of the Literature. F. G. Lewis. *Aeronautical Research Laboratories, Dept. of Supply, Commonwealth of Australia*, Report SM-187, Jan. 1952, 56 pages.

Critical review of all aspects of the strain aging of steel including effect on mechanical and physical properties; influence of composition; relationship between strain aging and quench aging; yield point and blue brittleness, and current theories. Graphs and photomicrographs. 72 ref. (Q general, P general, N7, ST)

667-Q. Report of Committee E-1 on Methods of Testing. *American Society for Testing Materials*, Preprint 50, 1952, 21 pages.

Recommended revisions. Includes standard hardness conversion table for nickel and high-nickel alloys; relationship between diamond-pyramid hardness, Brinell hardness, and Rockwell hardness; and proposed method for diamond-pyramid hardness of metallic materials. (Q29, Ni)

668-Q. Effects of Machining Specimens on the Results of Tension Tests of Annealed Aluminum Alloys. G. W. Stickley and K. O. Bogardus. *American Society for Testing Materials*, Preprint 66, 1952, 6 pages.

Tension tests of the annealed temper of 15 compositions of Al alloys show that yield strength of high-purity Al may be doubled merely by machining the test specimen and that some alloys having higher yield strengths are affected similarly but to a lesser extent. There is also some effect on elongation. No effect on tensile strength was found. (Q27, Al)

669-Q. Creep-Tension Relations at Low Temperatures of Metals. J. D. Lubahn. *American Society for Testing Materials*, Preprint 71, 1952, 28 pages.

The best previous notion of how to determine creep behavior from the results of tension tests was to cross-plot tension curves determined at various constant rates. This procedure will not yield the creep curves for metals like Cu or 61S-T Al tested at room temperature because the stress-strain curves at different rates differ by less than the variations in deformation resistance among the specimens. A new procedure is suggested, based upon a logarithmic relationship resulting from the hypothesis that mechanical behavior is independent of past history. 25 ref. (Q3, Q27)

670-Q. The Influence of Periodic Overstressing on the Creep Properties of Several Heat Resistant Alloys. G. J. Guarnieri and L. A. Yerkovich. *American Society for Testing Materials*, Preprint 72, 1952, 13 pages.

Exploratory data for evaluating the significance of variables controlling the cyclic-load creep properties of heat resistant alloys. Test equipment and procedures were developed for conducting overload tests under conditions similar to those encountered in turbojet aircraft during maneuvering. Tests were conducted on Type 347 stainless steel at 1200 and 1500° F. for various normal stress levels. Similar tests were performed on N-155 alloy and H.S. 21 alloy. Results are correlated into design charts which relate stress, time, temperature, ratio of overstress to normal stress, and time percentage of overstress application. (Q3, SS, Co, SG-h)

671-Q. A Survey of Embrittlement and Notch Sensitivity of Heat Resisting Steels. George Sachs and W. F. Brown, Jr. *American Society for Testing Materials*, Preprint 74, 1952, 15 pages.

Results of each series of experiments are presented separately and an attempt is made to determine the general effects of the important variables, to show the relationship between the phenomena observed, and to suggest a mechanism for the embrittlement. (Q23, AY, SS, SG-h)

672-Q. Effect of a Notch and of Hardness on the Rupture Strength of "Discaloy". F. C. Hull, E. K. Hann, and H. Scott. *American Society for Testing Materials*, Preprint 75, 1952, 10 pages.

In an Fe-Ni-Cr-Mo-Ti austenitic alloy, effects of hardness as varied by the hardener, Ti, were related to the behavior of the material in the presence of a notch. Creep-rupture and notched-bar rupture tests were conducted at 1000 and 1200° F. Tables and graphs. (Q4, Fe, SG-h)

673-Q. Influence of Sharp Notches on the Stress-Rupture Characteristics of Several Heat-Resisting Alloys. W. F. Brown, Jr., M. H. Jones, and D. P. Newman. *American Society for Testing Materials*, Preprint 76, 1952, 21 pages.

Stress-rupture tests were carried out on a number of low-alloy steels, ferritic stainless steels, and austenitic alloys. Both unnotched and sharply notched bars were tested at various temperatures. Ductilities were determined for both unnotched and notched specimens. It was found that all alloys tested were subject to notch weakening. Tests at 900, 1000, 1100, and 1200° F. on a low-alloy Cr-Mo-V steel indicated the notch sensitivity to be time-temperature dependent. (Q4, AY, SS)

674-Q. Effect of Notch Geometry on Rupture Strength at Elevated Temperatures. E. A. Davis and M. J. Manjoine. *American Society for Testing Materials*, Preprint 78, 1952, 21 pages.

Three series of creep-rupture tests of notched bars with varying geometry of the notch were performed at elevated temperatures on several heat resistant alloys. Effect on notch sensitivity on stress level, grain size, hardness, ductility, and heat treatment were also investigated. (Q4, SG-h)

675-Q. Theory of Time-Dependent Rupture and Interpretation of Some Stress-Rupture Data. D. N. Frey. *American Society for Testing Materials*, Preprint 80, 1952, 7 pages.

Proposes that the time-dependent rupture of a majority of steel and other austenitic alloys over the temperature range of interest in gas turbines (1000-1800° F.) be considered to have a mechanism involving both Griffith's and Zener's theories. Presents and interprets some data on effect of aging at 1400° F. prior to testing at 1200° F. on the strength of solution-treated 16-25-6 alloy. Effect of circumferential notches on elevated-temperature rupture strength. Graphs. 11 ref. (Q4, SS, SG-h)

676-Q. Effect of Sigma on Strength and Ductility of 25 Cr, 20 Ni Steel. G. V. Smith and E. J. Dulis. *American*

Society for Testing Materials, Preprint 82, 1952, 11 pages.

Sigma phase in 25% Cr, 20% Ni austenitic stainless steel was found to cause moderate strengthening at room temperature, severe loss in toughness even at temperature as high as 500° F., and moderate loss of creep-rupture strength at 1300° F. (Q23, SS)

677-Q. Recovery and Creep in an Alloy Steel. H. A. Lequear and J. D. Lubahn. *American Society for Testing Materials,* Preprint 83, 1952, 17 pages.

By interrupting a creep test and observing that the creep rate is higher afterward than before by amounts increasing with duration of the interruption, it was possible to establish that recovery had occurred. Recovery occurs in quenched-and-tempered, low-alloy, Cr-Mo-V steel at 1000, but not at 800° F. (Q3, AY)

678-Q. Exploratory Investigation of High-Temperature Sheet Materials. D. Preston. *American Society for Testing Materials,* Preprint 85, 1952, 24 pages.

High-temperature mechanical properties of several materials commercially available in sheet form were determined. They included three Fe-base strain-hardening-type alloys, three Fe-base age-hardening-type alloys, and three Co-base alloys in the annealed condition. Microstructures. Creep, stress-rupture, and short-time tension and yield data for these alloys from room temperature to 1800° F. (Q general, M27, SS, Co, SG-h)

679-Q. The Statistical Nature of the Fatigue Properties of SAE 4340 Steel Forgings. J. T. Ransom and R. F. Mehl. *American Society for Testing Materials,* Preprint 87, 1952, 19 pages.

Investigated as a part of a systematic study of the mechanical properties of forging steels. Both high and low-quality forgings of the same tensile-strength level were studied. Specimens were taken in the longitudinal and transverse directions. Procedures were used to permit statistical analysis of variability of endurance limit and life to failure. Variability was found to be greater than generally estimated from results of conventional non-statistical testing programs. (Q7, AY)

680-Q. A Statistical Interpretation of the Effect of Understressing on Fatigue Strength. E. Epremian and R. F. Mehl. *American Society for Testing Materials,* Preprint 90, 1952, 7 pages.

Purpose of the investigation was to study the understressing effect from a statistical viewpoint. The experimental work was an extension of the research reported in a companion paper. The materials studied were annealed Armco iron, and SAE 4340 in two heat treatments: quenched and tempered, and quenched and spheroidized. (Q7, Fe, AY)

681-Q. Effect of Prior Repeated Stressing on the Fatigue Life of 75S-T Aluminum. Thomas J. Dolan and Herbert F. Brown. *American Society for Testing Materials,* Preprint 91, 1952, 8 pages.

Damage produced in 75S-T Al alloy by repeated loading at one stress amplitude was measured by relative reduction of fatigue life when the specimen was retested at a second stress level. Specimens were prestressed at one of three selected stress levels and then tested to failure at a fourth or "test stress" level. (Q7, Al)

682-Q. An Investigation of the Coaxing Effect in Fatigue of Metals. G. M. Sinclair. *American Society for Testing Materials,* Preprint 92, 1952, 9 pages.

Fatigue resistance of some metals may be improved by understressing followed by gradually increasing the amplitude of the alternating stress in small increments, a procedure ordinarily called "coaxing". A study was made of the effect of various coaxing procedures on fatigue resistance of ingot iron, SAE 1045 and 2340 steels, 75S-T6 Al alloy, and annealed 70-30 brass. (Q7, Fe, CN, AY, Al, Cu)

683-Q. The Anisotropy of the Fatigue Properties of SAE 4340 Steel Forgings. J. T. Ransom and R. F. Mehl. *American Society for Testing Materials,* Preprint 93, 1952, 9 pages.

Studied statistically using heats which showed both high and low transverse average tensile reduction of area. Concludes that the anisotropy of fatigue properties, like the anisotropy in reduction of area, is determined to a large part by presence of fragmented stringer-type inclusions. (Q7, AY)

684-Q. Fatigue of 76S-T61 Aluminum Alloy Under Combined Bending and Torsion. William N. Findley. *American Society for Testing Materials.* Preprint 97, 1952, 16 pages.

Data for several combinations of bending and torsion. The special fatigue equipment for these tests. Fatigue data in torsion are presented for two different types of fatigue machines and results of static tests are tabulated. Literature on effect of combined stress in fatigue is reviewed and the results of the present series are compared with various theories. A possible correction for anisotropy, and energy theories of fatigue under combined stress. 49 ref. (Q7, Al)

685-Q. Prediction of Creep Curves From Stress-Strain Data. Yoh-Han Pao and Joseph Marin. *American Society for Testing Materials,* Preprint 141, 1952, 7 pages.

Develops a method for predicting tension creep-time relations for constant stresses from tensile stress-strain relations at various strain rates. The method was applied to test data obtained using plexiglas, and agreement between actual and predicted creep-time curves was found to be good. (Q3)

686-Q. An Electron Microscope Study of the Development of Fatigue Failures. W. J. Craig. *American Society for Testing Materials,* Preprint 167, 1952, 13 pages.

A pictorial comparison is made of deformation marks on the surface of α-brass, ingot iron, and Al under both static and repeated loading. Under static loading, deformation is a general process taking place in all crystals, while under conditions of repeated loading, deformation is an extremely localized phenomenon taking place in a few crystals or portions of crystals. (Q7, Cu, Fe, Al)

687-Q. Damping, Elasticity, and Fatigue Properties of Temperature-Resistant Materials. B. J. Lazan and L. J. Demer. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 611-646; disc., p. 647-648.

Above properties of several temperature-resistant materials were investigated in rotating cantilever-beam testing equipment. The room and elevated-temperature tests were designed to reveal changes in damping energy and dynamic modulus of elasticity during constant cyclic-stress fatigue tests at engineering stress levels. Usual S-N fatigue curves are presented in addition to a series of new diagrams designed to show effects of both stress magnitude and stress history on damping and elasticity properties. Two methods for comparing damping energies of a group of materials. Diagrams facilitate comparison of elasticity properties of materials tested at a given temperature. (Q21, Q7, Q8, SG-h)

688-Q. Planning and Interpretation of Fatigue Tests. Alfred M. Freudenthal. *American Society for Testing Materials,* "Symposium on Statistical Aspects of Fatigue", 1952, p. 3-13; disc., p. 14-22, 59-64.

Significance of scatter of results of fatigue tests and inadequacy of conventional procedures for their planning and interpretation. An attempt is made to derive the cumulative frequency distribution function of fatigue life at any particular stress amplitude from considerations of statistical theory. Results of rotating-beam and reversed torsion-fatigue tests on steel, Al, and Cu, when represented on logarithmic-normal probability paper, are shown to approximate the theoretically derived distribution. From the plotted cumulative distributions of fatigue life of Al at a number of stress amplitudes, a complete, 3-dimensional S-N-P relation is obtained. 15 ref. (Q7, ST, Al, Cu)

689-Q. On the Statistical Nature of Fatigue. Foster B. Stulen. *American Society for Testing Materials,* "Symposium on Statistical Aspects of Fatigue", 1952, p. 23-40; disc., p. 41-44, 59-64.

Several methods are proposed for determination of fatigue life and endurance limits. Results of tests utilizing these techniques as well as methods of graphically representing the data. The elementary theory of extreme values as related to size effect. Explanation of the understressing effect and of variation in notch sensitivity between different materials are proposed. 19 ref. (Q7)

690-Q. Statistical Analysis of Fatigue Data. Robert Plunkett. *American Society for Testing Materials,* "Symposium on Statistical Aspects of Fatigue", 1952, p. 45-54; disc., p. 54-64.

Follows Weibull's approach. Typical data are tabulated, charted, and discussed. Conclusions are summarized. (Q7)

691-Q. Crushing Strength of Steel Pipe Lined and Coated With Cement Mortar. Leslie Paul and Owen F. Eide. *Journal, American Water Works Association,* v. 44, June 1952, p. 525-530.

Experiments on 49-in. diam. pipe indicate dependability of the von Mises formula as applied to collapse from external pressure of large-diameter steel pipe with closed ends. Customary thicknesses of portland cement mortar of ¾ in. for coatings and ½ in. for lining strengthen 36-in. diam. steel pipe against collapse from external pressure by at least 600%. (Q23, CN)

692-Q. Gears of Ductile Iron Tested. Bayo Hopper. *Automotive Industries,* v. 107, July 1, 1952, p. 37, 86, 88, 90.

Testing procedures for above and results of inspection for wear and other effects. (Q general, Q9, CI)

693-Q. Errors in Stress Determination at the Free Boundaries of "Frozen Stress" Photoelastic Models. V. M. Hickson. *British Journal of Applied Physics,* v. 3, June 1952, p. 176-181.

Magnitude of errors. Case of a stress concentration, where small radii will introduce errors negligible at other points on the boundary. Diagrams. (Q25)

694-Q. Correlation of Fatigue Strength in Bending and Direct Stress. P. G. Forrest and H. J. Tapsell. *Engineering,* v. 173, June 13, 1952, p. 757-758. (A condensation.)

Results in both bending and direct stress on a normalized 0.24%

C steel at 400° C., and a fully softened Al alloy, R.R. 58, at 200° C., both of which are structurally stable at the respective temperatures. Dynamic stress-strain curves were obtained and results were correlated. Tables and graphs. (Q7, CN, AY)

695-Q. Ship Research. S. Livingston Smith. *Institution of Mechanical Engineers, Proceedings,* sec. A, v. 166, no. 1, 1952, p. 48-63.

Previously abstracted from *Engineering.* See item 280-Q, 1952. (Q25, K9, CN)

696-Q. Some Factors Affecting Wear on Cemented Carbide Tools. E. M. Trent. *Institution of Mechanical Engineers, Proceedings,* sec. A, v. 166, no. 1, 1952, p. 64-70; disc., p. 70-74.

Previously abstracted from *Engineer.* See item 64-Q, 1952. (Q9, C-n)

697-Q. Plastic Flexure on Mild Steel Beams of Rectangular Cross-Section. K. K. Shackell and J. H. Welsh. *Institution of Mechanical Engineers, Proceedings,* sec. A, v. 166, no. 1, 1952, p. 112-119; disc., p. 119-122.

Tests on a 0.28% C steel in tension and compression and in plastic flexure to determine the shape of the stress-strain curve immediately after the initial yielding, and to determine whether the upper yield stress can be relied upon as a criterion of design. Graphs and diagrams. (Q23, CN)

698-Q. How Good is 80B30? Temper Brittleness, Fatigue and Low Temperature Impacts Studied. R. N. Imhoff and James W. Poynter. *Iron Age,* v. 169, June 26, 1952, p. 102-107.

Air Force tests on above boron steel. Data summarized in tables and graphs. (Q23, Q6, Q7, AY)

699-Q. Conical Surfaces of Fracture Produced by Asymmetrical Impulsive Loading. John S. Rinehart and John Pearson. *Journal of Applied Physics,* v. 23, June 1952, p. 685-687.

Origin of conical fracture surface in thick-walled cylinders loaded through use of internal explosive charges. The angle of fracture associated with these conical surfaces was used to measure velocity of propagation of stress waves in low-carbon steel, brass, Cu, Pb, and Al. Tables, diagrams, and photographs. (Q26, CN, Cu, Pb, Al)

700-Q. The Change of the Elastic Constants of β-Brass With Composition. H. Jones. *Journal of Applied Physics,* v. 23, June 1952, p. 697.

Effects of ion-ion interactions on shear constants and bulk modulus, and Fermi-energy phenomena. (Q21, Cu)

701-Q. Some Observations on the Deformation of Polycrystalline Zinc. J. A. Ramsey. *Journal of the Institute of Metals,* v. 80, Dec. 1951, p. 167-171.

Polycrystalline Zn, when deformed, behaves in a similar way to Al in that, both at elevated temperature and at slow strain rates, it tends to form a subgrain or cell structure within the grains. Evidence is presented in support of the view that the cell structure is produced directly by deformation and cannot be adequately explained by the same mechanism as that suggested for polygonization. 14 ref. (Q24, Zn)

702-Q. Some Metallographic Observations on the Fatigue of Metals. P. J. E. Forsyth. *Journal of the Institute of Metals,* v. 80, Dec. 1951, p. 181-186.

Metallographic investigation of effects of cyclic stresses on microstructure of an Al ½% Ag alloy showed that factors other than simple slip are involved in the mechanism of fatigue at room temperature. There is evidence of a recovery process associated with formation of deformation bands and crystallites during fatiguing of the metal, and it is suggested that observed anomalies in effect of stress concentration on crack progress are the result of crystallite formation at the roots of the cracks. 12 ref. (Q7, Al)

703-Q. Observations on the Tension Texture of Aluminum. E. A. Calnan and Betty E. Williams. *Journal of Metals,* v. 4, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 743-744.

Three Al specimens were examined in detail, one of cold rolled high purity rod (99.99%), and two of commercial extruded rod (99.4%). Results of tests on annealed material. (Q24, Al)

704-Q. Preferred Orientations in Vanadium. Carl J. McHargue and Joseph P. Hammond. *Journal of Metals,* v. 4, 1952, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 745-746.

The cold rolled and the recrystallized wire textures, and the cold rolled and the recrystallized sheet textures for V. Results show that the textures in V are not significantly different from those reported for other body-centered-cubic metals. Diagrams. 13 ref. (Q24)

705-Q. Steam Pipe Materials for Advanced Steam Conditions. D. W. Crancher. *Machinery Lloyd* (Overseas Ed.), v. 24, June 7, 1952, p. 69, 71, 73, 75-85.

Four steels cover a range of temperatures up to 1050° F. These are plain carbon steel and three low-alloy steels containing Mo, Cr, and V. Resistance to creep and corrosion, stability of the microstructure, and suitability for manufacturing and welding. An appendix gives notes on creep of metals and creep testing. (Q3, R4, CN, AY)

706-Q. Investigation of Statistical Nature of Fatigue Properties. E. Epremian and R. F. Mehl. *National Advisory Committee for Aeronautics,* Technical Note 2719, June 1952, 119 pages.

Statistics of fatigue-fracture curves and endurance limits were determined for a variety of materials and, by analysis of these experimental results, effects of some metallurgical factors on the statistical nature of fatigue properties are shown. Inclusions play a dominant role and other factors such as composition and microstructure are of secondary importance. A number of other aspects of the problem were studied, namely, dependence of statistical variations in fatigue life on stress level in the fracture range, statistics of location of crack initiation, size effect and understressing effect from a statistical viewpoint, and form of the S-N diagram and method of plotting it. Materials tested were Armco iron and SAE 1050 and 4340 steels. 50 ref. (Q7, Fe, CN, AY)

707-Q. Influence of Structure on Properties of Sintered Chromium Carbide. H. J. Hamjian and W. G. Lidman. *National Advisory Committee for Aeronautics,* Technical Note 2731, June 1952, 21 pages.

Results show that room-temperature strength and hardness are influenced by stages of sintering, which are defined by grain size and by number, size, location, and shape of pores. It was found that coarse-grained structures are detrimental to room-temperature strength, but perhaps not at elevated temperatures. (Q23, Q29, H15, Cr, C-n)

708-Q. The Formation of Immobile Dislocations During Slip. A. H. Cottrell. *Philosophical Magazine,* ser. 7, v. 43, June 1952, p. 645-647.

Mathematical approach. Lomer's reaction, a second reaction, an alternate reaction sequence, and work hardening. (Q24)

709-Q. An Electron-Microscope Study of the Effect of Temperature and Strain-Rate on the Mechanism of Deformation of Aluminium. R. I. Garrod, J. W. Suiter, and W. A. Wood. *Philosophical Magazine,* ser. 7, v. 43, June 1952, p. 677-685.

Electron-microscope observations show that there are three basic stages in the mechanism of deformation of metals. Interpretation of these experimental observations, in terms of structural changes, and their possible relationship to the dislocation theory of deformation. Diagrams. 10 ref. (Q24, Al)

710-Q. (French.) **Measuring the Young's Modulus of Metal Bars by an Electromagnetic Method.** Jean Savornin and Georges Renucci. *Comptes Rendus hebdomadaires des Séances de l'Academie des Sciences,* v. 234, May 19, 1952, p. 2045-2046.

Experimental arrangement. The method can also be applied to nonmagnetic rods. Results for a Cd bar. (Q21, Cd)

711-Q. (French.) **Fundamental Experiments in the Fracture of Solids.** A. Guinier. *Métaux: Corrosion—Industries,* v. 27, Apr. 1952, p. 150-155.

Reviews complex phenomena on the basis of the literature. Calculation of cohesion in ionic crystals; measurement of surface tension of solids; the role of defects; and the work of Griffith, Joffé, Smekal, and Orowan. 15 ref. (Q26, P10)

712-Q. (French.) **Contribution of the Method of Rheo-Electric Analogies to Calculation of Stresses.** L. Malavard. *Métaux: Corrosion—Industries,* v. 27, Apr. 1952, p. 169-184.

Reviews possibilities and applications of above method on the basis of the literature. Basic principles, determination of total stresses, torsion in simple and rectangular bars, and determination of stresses in an elastic plane. Diagrams and illustrations. (Q25)

713-Q. (German.) **Rheological Consideration of Creep of Steel.** Hans Umstätter. *Archiv für das Eisenhüttenwesen,* v. 23, Mar./Apr. 1952, p. 119-124; disc., p. 124-126.

Proposes the application of rheology, particularly its concepts of ductility and relaxation, to creep of various substances. Compares results of tensile tests, compression tests, and notched-bar, impact-bending tests on bituminous asphalt with those obtained on steel wire. Interpretation of the results. Tables and graphs. 14 ref. (Q3, ST)

714-Q. (German.) **Joining of Sintered Bodies to Compact Metals.** Wilhelm Hofmann and Ernst Schmalenbach. *Archiv für das Eisenhüttenwesen,* v. 23, Mar./Apr. 1952, p. 135-142; disc., p. 142-143.

Experimental set-up and types of rods used for tensile tests and shearing tests on compound sintered bodies. Four types of Fe powder compacts were used in the tests. Influence of pressure, sintering temperature, and sintering time. Results of metallographic investigation of the test specimens, especially the effect of Cu additions to Fe powder. Graphs, micrographs, diagrams, and photographs. 13 ref. (Q27, Q2, H general, M27, Fe)

715-Q. (German.) **Measurement of Tensile Stress, Rolling Pressure, and Rolling Work by Means of Electrical Strain Gages.** Kurt Fink and Werner Lueg. *Archiv für das Eisenhüttenwesen,* v. 23, Mar./Apr. 1952, p. 151-156.

Experimental apparatus. Results of tensile and cold rolling tests; application of the method in industry. Diagrams, tables, and graphs. 10 ref. (Q25, F23)

716-Q. (German.) **Practical Stress Analysis With Electrical Strain Gages.** Otto Krisement. *Archiv für das Eisenhüttenwesen,* v. 23, Mar./Apr. 1952, p. 157-161.

Computation of elongations in stress values; graphic, nomographic, mechanical, and electrical processes for interpreting these values. Some devices used for this purpose. Diagrams. (Q25)

717-Q. (German.) **Creep Limit and Its Relationship to Other Mechanical Properties From the Point of View of Physics.** Albert Kochendörfer. *Archiv für das Eisenhüttenwesen,* v. 23, May-June 1952, p. 183-191; disc., 191-192.

The plastic behavior of monocrystals, such as slip, rate of solidification, and the significance of displacements. Proposes application of the same laws to polycrystals. Possibility of influencing the creep curve, and thus the creep resistance. Data for a variety of ferrous and nonferrous metals. Graphs and tables. 57 ref. (Q3)

718-Q. (German.) **Reciprocal Relationship Between Stress and Deformation Gradients. Part 3. Notch Strength.** Franz Bollenrath and Alex Troost. *Archiv für das Eisenhüttenwesen,* v. 23, May-June 1952, p. 193-201.

Proposes a calculation method for notch-effect values. Relationship between notch sensitivity and resistance to plastic deformation. Largely theoretical and mathematical, with graphical interpretation. 17 ref. (Q23)

719-Q. (German.) **The Alternating-Bending Strength of Nitrided Specimens of Varying Diameter.** Karl Wellinger and Paul Gimmel. *Archiv für das Eisenhüttenwesen,* v. 23, May-June 1952, p. 203-205.

Investigation was done on specimens with diameters of 5, 6.5, and 8 mm., of nitrided steel, containing 34% Cr and 6% Al. Tables, charts, and macrographs. (Q5, SS)

720-Q. (German.) **Further Investigations and Observations on Cold Working.** F. H. Müller. *Kolloid Zeitschrift,* v. 126, May 1952, p. 65-72; disc., p. 72.

The deforming process is shown to be irreversible and is ascribed to forced transpositions, corresponding to visco-elastic hysteresis comparable to magnetic hysteresis. Graphs. 14 ref. (Q24)

721-Q. (German.) **Deformability of Slag Inclusions in Steel and Its Significance in Evaluation of Forgings.** Erich Scheil and Rudolf Schnell. *Stahl und Eisen,* v. 72, June 5, 1952, p. 683-687.

Difference between behavior of oxide and sulfide inclusions upon deformation. Dependence of deformability of oxide inclusions on temperature. Determination of degree of deformation of sulfide inclusions, and of forging temperature from deformation of the silicates. Graphs, tables, and photomicrographs. (Q23, F22, ST)

722-Q. (German.) **Radiographic Stress Measurements of Individual Crystals of Steel Under Tensile Stress.** Gerhard Frohnmeyer and Ernst-Günter Hofmann. *Zeitschrift für Metallkunde,* v. 43, May 1952, p. 151-158.

Describes method of oblique exposure for making radiographs of crystals. Results of measurements on pure ferrite, and on ferritic-pearlitic surfaces. Tables, graphs, and micrographs. 14 ref. (Q25, M26, ST)

723-Q. (Russian.) **Thermodynamic Considerations in the Resistance to Plastic Deformation of Two-Phase Metallic Alloys.** K. A. Osipov and B. P. Stoiukhim. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Mar. 21, 1952, p. 439-442.

Theoretical, mathematical analysis. (Q24)

724-Q. (Russian.) **The Law of Static Friction.** S. B. Ratner. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Mar. 21, 1952, p. 443-446.

Friction tests were made on rubber with metals, plexiglas, and other materials. Coefficient of friction was found to change with a change of the load. Data are charted. (Q9)

725-Q. (Russian.) **Evolution of Heat During Plastic Deformation.** N. S. Fastov. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 21, 1952, p. 851-855.

A mathematical discussion in relation to type of deformation (tension or torsion). By means of the equations derived, energy converted to heat, energy due to residual stress, and energy due to work hardening may be calculated. (Q24, P10)

726-Q. (Russian.) **Method of Determining the Regularity of the Change of Hardness and α-and γ-Phases of Steel During Heating to 1100° C. in a Vacuum.** M. G. Lozinskii. *Doklady Akademii Nauk SSSR,* new ser., v. 84, May 1, 1952, p. 63-66.

Experiments were made on hot hardness of low-carbon steel. Equipment and charted data. (Q29, CN)

727-Q. (Russian.) **The Influence of Cracks on the Mechanical Properties of Materials in Various Stress States.** Ia. B. Fridman, T. K. Zilova, and N. I. Zhukova. *Doklady Akademii Nauk SSSR,* new ser., v. 84, May 1, 1952, p. 67-70.

Various combinations of torsion, tension, and compression (in sequence) were used in tests on hardened steel specimens. Data are charted. Macrographs illustrate fractured pieces. (Q27, Q28, Q1, CN)

728-Q. (Russian.) **Influence of the Thickness of the Babbitt Layer on Its Wear in Bearings.** S. E. Gurevich. *Doklady Vsesouiznoi Ordena Lenina Akademii Sel'skohoziaistvennykh Nauk imeni V. I. Lenina,* v. 17, No. 1, 1952, p. 44-47.

Tests and test equipment. Data are tabulated and charted. (Q9, SG-c, Sn, Pb)

729-Q. (Russian.) **The Nature of "Naphthalenic" (Coarse - Grained, Transcrystalline) Fracture in High Speed Steel.** V. D. Sadovskii, K. A. Malyshev, and N. V. V'ial. "Izvestiia Sektora Fiziko-Khimicheskogo Analiza", v. 20 (Academy of Sciences of the USSR), p. 345-350.

An experimental investigation. Data are tabulated and illustrated. (Q26, M27, TS)

730-Q. (Russian.) **Wear Resistance of Metal-Cutting Machine Guides.** V. A. Ambarov. *Stanki i Instrument,* v. 23, Jan. 1952, p. 21-24.

Results of experimental investigation for a number of different steels and cast irons. Tables and graphs. (Q9, G17, CI, ST)

731-Q. (Swedish.) **Volume Sensitivity of Gray Cast Iron.** Gustav Meyersberg. *Gjuteriet,* v. 42, May 1952, p. 71-82.

Variation of strength of specimens. Volume sensitivity of gray cast iron and the so-called rim or skin effect were studied. Diagrams and graphs. 12 ref. (Q23, P10, CI)

732-Q. **More Thoughts on Fatigue.** P. Litherland Teed. *Aeroplane,* v. 82, June 27, 1952, p. 787-790.

Some interesting methods for increasing the fatigue life of aircraft structures include development and exploration of residual stresses and mechanical production of surface compressive stresses. Data are tabulated. 18 ref. (Q7, Q25)

733-Q. **Mechanical and Physical Properties of Aluminium Cast Iron.** J. W. Bampfylde. *British Cast Iron Research Association Journal of Research and Development,* v. 4, June 1952, p. 340-359.

Development of a scale and growth resisting cast iron ("Cralfer"). Special treatment was developed to overcome the tendency of Al irons to oxidize. Details of microstructure. Covers Al cast irons without alloy additions; and Al cast irons with low and with high Cr contents. Graphs, photomicrographs, and tables. (Q general, P general, M27, CI)

734-Q. **Instrumentation.** Ralph H. Munch. *Industrial and Engineering Chemistry,* v. 44, July 1952, p. 65A-66A, 68A.

A bonded-wire-type strain gage which will measure simple pickups for pressure, load, and torque. Schematic diagrams. (Q25, S18)

735-Q. **Boundary Slip in Bicrystals of Tin.** K. E. Puttick and Ronald King. *Journal of the Institute of Metals,* v. 80, June 1952, p. 537-544.

Specimens of Sn consisting of two crystals meeting in a straight boundary were stressed in shear to cause relative movement of the crystals at the boundary. Relation between relative movement and time under steady stress was examined at a number of stresses and temperatures, for a standard type of specimen in which the *c*-axes of the crystals were at right angles to one another and at 45° to the boundary. Appendixes give information on growth of crystals and conditions for straight boundaries, and on grain-boundary surfaces. Diagrams, graphs, macro and micrographs. 15 ref. (Q24, M27, M28, Sn)

736-Q. **X-Ray Diffraction Studies in Relation to Creep.** G. B. Greenough, Catherine M. Bateman, and Edna M. Smith. *Journal of the Institute of Metals,* v. 80, June 1952, p. 545-550.

To investigate a hypothesis regarding the mechanism of creep put forward by Greenough and Smith, two Al-Ag alloys, one a solid solution and the other containing a precipitate, were examined. Experiments were also carried out on recovery of specimens quickly pulled at either 20 or 300° C. Tables and X-ray photographs. 18 ref. (Q3, M22, Al)

737-Q. **Electric Resistance Strain Gages.** J. A. Sweeney Jr. and D. K. Schaeve. *Machine Design,* v. 24, July 1952, p. 224-226, 228-230.

Operation of bonded-wire strain gages. (Q25)

738-Q. **Evaluating Mechanical Shock Resistance.** Bernard Goldberg and T. E. Pardue. *Machine Design,* v. 24, July 1952, p. 236-238, 241.

Methods and apparatus for measuring resistance of materials to mechanical shock were studied in the Naval Research Laboratory. Test materials used were a group of sand-cast Al alloys of special interest to the Navy. (Q6, Al)

739-Q. **High Tensile Beta Brass.** A. R. Bailey. *Metal Industry,* v. 80, June 27, 1952, p. 519-522, 526.

An investigation of intercrystalline weakness. Twelve different alloys containing 50.71-63.35% Cu, 28.13-48.93% Zn, 0-20.5% Al, 0-1.94% Mn, 0-2.10% Fe, 0-0.45% Sn, and 0-1.02% Ni were examined for microstructure and tensile properties. Tables and micrographs. 12 ref. (Q27, M27, Cu, Zn)

740-Q. **A Survey of High-Temperature Materials.** J. M. Robertson. *Metal*

Treatment and Drop Forging, v. 19, June 1952, p. 275-283.

Mechanical properties of metals at high temperatures and types of alloys available for use between 450 and 950° C. Precipitation hardening. Numerous graphs. (To be continued) (Q general, J27, SG-h)

741-Q. The Creep and Fatigue Properties of Two Commercial Aluminium Bronzes at 500° C. J. J. Carter, D. N. Mends, and J. McKeown. *Metallurgia,* v. 45, June 1952, p. 273-281.

The alloys are used in tubular heat exchangers for gas turbines. Scaling behavior; creep, stress-rupture time, and fatigue tests in both cold worked and annealed conditions; structure after these tests; effect of grain size on creep resistance of the annealed materials; and changes when held at 500-600° C. for long periods without applied stress. Structure and mechanical-property data on the as-received materials. Graphs, tables, and photomicrographs. (Q3, Q7, Cu)

742-Q. The Influence of Shot Peening on the Fatigue Properties of Steel. W. J. Harris. *Metallurgia,* v. 45, June 1952, p. 299-300.

Experimental results on various steels. Examples where beneficial effects are obtained. Tables. (Q7, G23, CN, ST)

743-Q. Equipment for Creep Testing at Temperatures up to 200° C. R. J. M. Payne. *Metallurgia,* v. 45, June 1952, p. 322-324.

The time taken in adjusting the temperature and temperature uniformity of creep-test specimens, particularly at temperatures below 200° C., is greatly reduced by oil-bath heating of the test pieces. The equipment enables six tests to be carried out simultaneously at the same temperature. Photograph and apparatus diagrams. (Q3)

744-Q. The Flow of Polycrystalline Metals Under Simple Shear. E. N. da C. Andrade and K. H. Jolliffe. *Proceedings of the Royal Society,* ser. A, v. 213, June 5, 1952, p. 3-26.

Creep of three polycrystalline metals—commercial Pb, pure Pb, and Cd—were investigated under conditions of simple shear, by a method in which a constant couple is applied to an annulus cut in a thicker disk of the metal. For comparison, normal tensile tests were carried out on wires of the same metals. Cause of the elimination of permanent creep under the conditions of simple shear, and a variety of experimental results explained in terms of intracrystalline and boundary effects. Numerous graphs and tables. 11 ref. (Q3, Q2, Pb, Cd)

745-Q. A Critical Look at Fatigue Equations. E. H. Schuette. *Product Engineering,* v. 23, July 1952, p. 150-151.

Empirical fatigue equations are unreliable and often misleading. This is demonstrated by application of four such equations to test data for a Mg alloy. Values of the endurance limit range from 0 to 19,000 psi. for the same material, depending on which of the four equations is used. (Q7, Mg)

746-Q. (Book) **Symposium on Statistical Aspects of Fatigue.** 64 pages. 1952. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. (Special Technical Publication 121.)

Introduction by R. E. Peterson plus three papers and accompanying general and specific discussions. Papers are separately abstracted. (Q7)

747-Q. (Book—German.) **Die Prüfung Metallischer Werkstoffe.** (Testing of Metallic Materials). Kurt Matthaes. 210 pages. 1952. Metall-Verlag, G.m.b.H., Berlin-Grunewald, Germany. 15 DM.

A classified collection of many different methods of physical and mechanical testing, corrosion tests, and inspection methods. Bibliography and subject index. (Q general, P general, R11, S general)

R

CORROSION

319-R. Report of Subcommittee II on Performance Tests. Atmospheric Exposure of Copper-Nickel-Chromium Deposits on High-Carbon Steel. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 204-213.

Previously abstracted from Preprint 13S. See item 265-R, 1951. (R3, Cu, Ni, Cr, CN)

320-R. Corrosion Testing: Twenty-Fifth Edgar Marburg Lecture. F. L. LaQue. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 495-582.

Corrosion-test procedures and typical results described by text, tables, graphs, and photographs. Atmospheric corrosion studies; acid testing; other accelerated tests; relations between rust color and corrosion; effects of position in test; long-time tests of different steels and irons to atmospheric corrosion; comparison of atmospheres; corrosion tests of insect screens; tests in waters; galvanic corrosion; atmospheric galvanic corrosion tests; salt-spray tests; laboratory total-immersion tests; alternate immersion tests; boiling HNO_3 test; plant corrosion tests; and paint tests. Includes statistical analysis of atmospheric corrosion data on Cu-bearing steels in a marine atmosphere. 95 ref. (R11)

321-R. The Scaling of Zirconium in Air. C. A. Phalnikar and W. M. Baldwin, Jr. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 1038-1059; disc., p. 1059-1060.

Both O_2 and N_2 enter into the scaling reaction. Zr forms a double-layered scale: an outer white or buff scale (monoclinic ZrO_2) that predominates at temperatures below 1050° C. and an inner black scale (monoclinic and tetragonal ZrO_2, cubic ZrN, and possibly N) that occupies the greater thickness at temperatures above 1050° C. The outer white layer does not form immediately but requires a definite time to nucleate. Zr strip also undergoes extraordinary dimensional changes during scaling. Increases in dimensions in the rolling plane trebled the original sample area in some cases. Graphs and photomicrographs. 12 ref. (R2, Zr)

322-R. Report of Committee D-19 on Industrial Water. *American Society for Testing Materials,* Preprint 48, 1952, 19 pages.

Includes proposed method of sampling steam and water at subatmospheric pressure and proposed corrosivity test for industrial water (USBM Embrittlement Detector Method.) (R4, ST)

323-R. Atmospheric Corrosion of Low Alloy Steels. H. R. Copson. *American Society for Testing Materials,* Preprint 70, 1952, 22 pages.

In 1941 five sets of 71 low-alloy steels were exposed to the industrial atmosphere at Bayonne, N. J., and to the marine atmosphere at Block Island, R. I. Gives complete results through 9-year exposure, including weight losses, pit depths, thickness measurements, calculated pitting factors, and weight of rust on the specimens. Detailed weight loss vs. time curves, pit-depth vs. time curves, and weight-loss vs. composition curves are plotted. (R3, AY)

324-R. Galvanic Corrosion. E. C. Reichard. *Chemical Engineering Progress* (Engineering Section), v. 48, June 1952, p. 269-271.

Galvanic corrosion, and ways to prevent costly failures within chemical plants. (R1)

325-R. Chemical Causes of Wear. J. J. Broeze. *Engineering,* v. 173, May 30, 1952, p. 693-694.

Three typical fields in which chemical causes of wear, of practical significance, have been identified: general lubrication, where there is chemical attack by the atmosphere; in engine and gear lubrication, with chemical attack by the lubricants; and in engine lubrication, with chemical attack by the combustion products. Data are charted. (R7, R3)

326-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 44, June 1952, p. 81A-82A, 84A.

Materials of construction for handling caustic, with particular reference to stress-corrosion of welded steel. Graphs. (R1, ST)

327-R. The Weathering of Sheet Metal Building Materials. Theodore H. Oren. *Modern Metals,* v. 8, May 1952, p. 60, 62.

Previously abstracted from *Technical News Bulletin (National Bureau of Standards).* See item 273-R, 1952. (R3, Al, Zn, ST)

328-R. Velocity of Action of Oxygen, Hydrogen Sulfide, and Halogens on Metals. G. Tammann and W. Köster. *National Advisory Committee for Aeronautics,* Technical Memorandum 1339, June 1952, 21 pages. (Translated from *Zeitschrift für anorganische und allgemeine Chemie,* v. 123, Aug. 1952, p. 196-201, 208-224).

Results of investigation tabulated, charted, and discussed. Fundamental equations of the process. Application to a large number of specific metals and alloys. (R9)

329-R. Atmospheric Exposure Tests of Nailed Sheet Metal Building Materials. Theodore H. Orem. *National Bureau of Standards,* Building Materials and Structures Report 128, Mar. 28, 1952.

See abstract of "The Weathering of Sheet Metal Building Materials", *Technical News Bulletin* (National Bureau of Standards); item 273-R, 1952. (R3, Al, Zn, ST)

330-R. Influence of Sulphate-Reducing Bacteria on the Corrosion Potential of Iron. J. N. Wanklyn and C. J. P. Spruit. *Nature,* v. 169, May 31, 1952, p. 928-929.

A study made under both autotrophic and heterotrophic conditions using Armco ingot iron. Graph. (R1, Fe)

331-R. Film-Rupture Mechanism of Stress Corrosion. *Technical News Bulletin* (National Bureau of Standards), v. 36, Apr. 1952, p. 54-55. (Condensed from "Film-Rupture Mechanism of Stress Corrosion", Hugh L. Logan.)

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 250-R, 1952. (R1, Al, Cu, Mg)

332-R. Analysis of Some Corrosion Problems in Petroleum Refineries. J. F. Mason, Jr. *Transactions of the American Society of Mechanical Engineers,* v. 74, Apr. 1952, p. 305-312; disc., p. 312-313.

Fifteen actual corrosion problems and steps taken to analyze them in the light of practical experience

and available test data obtained under the same or similar conditions. Indicates that Type 502 stainless steel is a highly acceptable and reasonably economical material as a replacment for mild steel, except in instances where mineral acids or chlorides may be present as well as highly alkaline solutions at elevated temperatures. Under the latter conditions, the trend is toward use of more highly alloyed materials such as Monel and Ni together with Cu-base alloys like 70-30 cupronickel, Admiralty metal, and Muntz metal. (R5, SS, Cu, Ni)

333-R. (French and German.) Corrosion Resistance of Aluminum and "Aldrey" Cables. G. Dassetto. *Aluminium Suisse,* v. 2, May, 1952, p. 96-99.

Behavior of the "Aldrey" Al alloy in particularly difficult climate zones. Various examples of its use in practice. 14 ref. (R3, T1, Al)

334-R. (German.) The Tube Camera of the Ruhrgas AG. Walter Wunsch and Siegfried Brockhaus. *Gas- und Wasserfach,* v. 93, May 15, 1952, p. 229-233.

Stereoscopic camera which can be inserted into gas pipe lines under pressure in order to study internal corrosion. Typical results. (R11)

335-R. (German.) The Influence of Adsorption Phenomena on the Oxidation of Metals at Elevated Temperatures. H. J. Engell and K. Hauffe. *Metall,* v. 6, June 1952, p. 285-291.

Discusses the reaction mechanism of oxidation on the basis of the literature, with particular regard to the views advanced by Moore and Lee *(Transactions of the Farady Society;* item 274-R, 1951.) Graphs. 19 ref. (R2, Zn)

336-R. Report of Committee A-5 on Corrosion of Iron and Steel. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 109-125.

Previously abstracted from Preprint 4, 1951. See item 238-R, 1951. (R general, ST, Zn, Cu, Pb)

337-R. Report of Committee A-5 on Corrosion of Iron and Steel. *American Society for Testing Materials,* Preprint 4, 1952, 17 pages.

Recommendations for revisions in standards, specifications, and test methods. Extensive tabular data on atmospheric corrosion of 22-gage Cu-bearing, non-Cu-bearing, and galvanized, black, corrugated sheet steel. Specification revisions for Zn-coated sheet steel.
(R general, R3, S22, Fe, ST)

338-R. Corrosion of Metals Near Wood. *Chemical Age,* v. 66, June 7, 1952, p. 871-872.

Chemical factors that influence wood-metal compatibility, on the basis of work of the British Forest Products Research Laboratory. Mentions especially lead and iron.
(R7, Pb, Fe)

339-R. New Standard for Coating Thickness. Max Kronstein. *Chemical Engineering,* v. 59, June 1952, p. 201-203.

Coating thickness should be three times the profile depth to resist moisture penetration. This conclusion was reached after measuring the profile of grit-blasted steel surfaces and determining the effect of various thicknesses of organic coatings on moisture penetration. The electrographic printing method was used to detect moisture penetration and under-film spreading of moisture, and profiles were studied by a surface analyzer. Charts and electrographic prints.
(R11, S15, ST)

340-R. Hastelloy Alloy C. Edward D. Weisert. *Chemical Engineering,* v. 59, June 1952, p. 297-298, 300, 302, 304-306, 308-310, 312.

Corrosion resistance of this Ni-Mo-Cr alloy to more than 150 corrosives, with data on a variety of properties and processes, forms available, and applications. Numerous charts. (R general T29, Ni)

341-R. What's Ahead in Corrosion Prevention. Herbert H. Uhlig. *Chemical Engineering,* v. 59, June 1952, p. 314.

Extensions and improvements in cathodic protection, coatings of various types, deaeration, inhibitors, etc. (R10, L general)

342-R. Corrosion Problems in Industry. W. H. J. Vernon. *Chemistry & Industry,* June 14, 1952, p. 524-526.

Briefly discussed. (R general)

343-R. The Corrosion of Gas-Burning Appliances. J. Welsh. *Chemistry & Industry,* June 21, 1952, p. 551-555.

Experimental methods have been developed for measuring the dew-point and, hence H_2SO_4 vapor concentration in combustion products, and new techniques for evaluating the extent of corrosion of metallic specimens by deposition of H_2SO_4 from the products of combustion of manufactured gas containing sulfur. It is shown that serious problems may occur in domestic water heaters. Methods of attacking these problems. 14 ref. (R9)

344-R. Gravimetric Investigation Into the Oxidation of Copper-Tin Alloys at Various Temperatures. F. De Carli and N. Collari. *Engineers' Digest,* v. 13, June 1952, p. 183-185, 193. (Translated.)

Previously abstracted from *Metallurgia Italiana.* See item 144-R, 1952. (R2, Cu, Sn)

345-R. Combating Corrosion From Indusrtial Chemicals. George Shaffer. *Industry and Power,* v. 63, July 1952, p. 75-90.

Special report includes extensive charts, tables, and graphs. 37 ref. (R29)

346-R. Fretting Corrosion Studies With a Modified Fafnir Machine. T. G. Roehner and E. L. Armstrong. *Institute Spokesman,* v. 16, June 1952, p. 8-9, 11-12, 15.

Compares original and modified Fafnir testers. Test procedure and results of tests on 11 lubricating grease-additive combinations. (R1)

347-R. A Contribution to the Study of the Action of Certain Inhibitors Upon Corrosion in Chloride-Polluted Water. W. S. Patterson and A. W. Jones, *Journal of Applied Chemistry,* v. 2, May 1952, p. 273-280.

Comparative effects of potassium dichromate, sodium nitrite, sodium benzoate, and soluble oil as corrosion inhibitors were partially examined. The corrosion media used were NaCl solution and dilute sea water. Tables, photographs, and graphs. (R10, R4, ST, Fe)

348-R. Film Formation on Metals in Hydrocarbons. Andrew Gemant. *Journal of the Electrochemical Society,* v. 99, July 1952, p. 279-284.

Using a radioactive-tracer technique, rate of salt-film formation on Cu, Pb, and Zn, in solutions of tridecanoic acid in hydrocarbon oil was measured. Effects of amine addition and oxidized oil. Film formation by electrochemical action was studied on Pb and Ag. Tables and graphs. (R7, Cu, Pb, Zn, Ag)

349-R. The Rate of Corrosion of Silver in Ferric Perchlorate Solutions. Cecil V. King and Frances S. Lang. *Journal of the Electrochemical Society,* v. 99, July 1952, p. 295-300.

Effect of concentration of ferric, ferrous, and silver ions, of other salts including sulfates, and of stirring speed, temperature, and electrical polarization. Evidence for the existence of a sulfato-ferric ion. Tables and graphs. 14 ref. (R5, Ag)

350-R. A Potentiometric Study of the Interaction of Zinc Ions With Sodium Silicates. J. Fred Hazel, Wallace M. McNabb, and Paul E. Machemer. *Journal of the Electrochemical Society,* v. 99, July 1952, p. 301-307.

$ZnSO_4$, $ZnCl_2$, and $Zn(NO_3)_2$ were titrated potentiometrically with standard solutions of NaOH and various Na silicates. Results from the standpoint of use of silicates as inhibitors of aqueous corrosion of Zn. Graphs and table. 32 ref. (R10, Zn)

351-R. A Mechanism of Stress-Corrosion in Aluminium-Magnesium Alloys. C. Edeleanu. *Journal of the Institute of Metals,* v. 80, Dec. 1951, p. 187-191.

Attack on Al and Al-rich alloys, immersed in neutral chloride solutions, tends to be restricted to a limited area owing to the autocatalytic nature of the anodic reaction. On homogeneous alloys, corrosion causes scattered pits which can increase either in depth or in area; but in the case of alloys possessing a path of easy corrosion, attack takes the form of trenching and is confined to the tips of the cracks so formed. This latter type of corrosion leads to great mechanical weakening. From experiments on Al 7% Mg alloy, it is concluded that stress exerts no influence during the first stages of the process but that corrosion plays a vital role during the final rapid cracking. 13 ref. (R1, Al)

352-R. The Dissolution of Metals Over the Temperature Range of 25 to −60°. III. The Dissolution of Zinc in Hydrochloric Acid—Methyl Alcohol-Water Solutions. J. Y. Welsh and A. B. Garrett. *Journal of Physical Chemistry,* v. 56, June 1952, p. 727-730.

Data were obtained for the rates of depolarized dissolution of polished and pre-etched Zn in HCl-CH_3OH-H_2O solutions under dynamic conditions. (R5, P13, Zn)

353-R. Aluminum Corrosion Prevention. Part 2. Causes and Results of Electrochemical Action Described. George W. Orton. *Light Metal Age,* June 1952, p. 18-20.
(R1, Al)

354-R. A Parabolic Law for Metal Oxidation Which Is Not Controlled by Diffusion. W. J. Moore. *Philosophical Magazine,* ser. 7, v. 43, June 1952, p. 688-689.
(R2)

355-R. Aluminium Versus Tinned-Steel Milk Cans—A Comparative Study. Glenn R. Watson, L. R. Bryant, and W. H. Sproule. *Scientific Agriculture,* v. 32, June 1952, p. 337-350.

Investigations included effect of milk and cream; effect of cleaning and sterlizing solutions on Al and tinned steel; the numbers of bacteria remaining in milk cans after commercial cleaning; and the effect of service. Graphs and tables. 12 ref. (R7, T29, Sn, CN, Al)

356-R. (German.) The Behavior of Weldments Toward Chemical Attack. W. Rädeker. *Schweissen und Schneiden,* v. 4, June 1952, p. 198-203.

Types of chemical attack, intercrystalline attack, and effect of welding defects. Macrographs. (R2)

357-R. (German.) The Effect of Phase Boundary Reaction in the Oxidation of Metals and Alloys at Higher Temperatures. K. Hauffe and H. Pfeiffer. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 390-398.

Shows, on the basis of experimental results on oxidation of Fe to FeO at 1000° C., and on the sulfurization of Ni to NiS at 670° C., that the parabolic time law and the Wagner scaling theory are not applicable, since boundary surface reactions are rate dependent. Presence of metal oxide vapors (MoO_3 and Li_2O) in

the oxidizing atmosphere increase the rate of oxidation of metals and alloys, or may decrease it, which is interpreted on the basis of the theory of the formation of defects. Tables and graphs. (R2)

358-R. (German.) **Influence of Stress and Temperature in Stress-Corrosion Experiments.** Otto Lissner. *Zeitschrift für Metallkunde,* v. 43, May 1952, p. 147-150.

Discusses the justification for the plotting of log-log coordinates for stress dependence of life duration of test pieces exposed to stress-corrosion. Temperature dependence and permissible temperature increase in stress-corrosion experiments. Data are charted for steels and Al alloys. 14 ref. (R1, R11, Al, ST)

359-R. (Italian.) **Aluminum and Its Alloys in the Wine Industry.** L. Gentilini and G. Missier. *Alluminio,* v. 21, May 1952, p. 130-134.

Al of 99.5% purity and three Al alloys were tested by immersion of strips in three types of wine for 30 days at 20 and 40° C. Corrosion took place and the taste of the wine was badly impaired. Further tests in which Al-alloy flasks were internally coated with a phenolic resin gave satisfactory results. (R7, T29, L26, Al)

360-R. (Russian.) **The Role of Nitrogen in the High-Temperature Oxidation of Titanium in Air.** V. I. Arkharov and G. P. Luchkin. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 21, 1952, p. 837-839.

The rate of oxidation of Ti and Ti-Fe alloys in air and in O_2 was investigated at temperatures up to 1200° C. Data are charted. (R2, Ti)

361-R. (Russian.) **Dissolving Steels in Sulfuric Acid Under the Influence of Ultrasonic Vibration.** A. P. Kapustin and M. A. Fomina. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 21, 1952, p. 847-849.

Steel specimens were dissolved in 1N H_2SO_4 during subjection to ultrasonic vibrations of various intensities. Data are tabulated and charted. (R5, ST)

362-R. Mercury and Its Compounds —a Corrosion Hazard. M. H. Brown, W. W. Binger, and R. H. Brown. *Corrosion* (Technical Section) v. 8, May 1952, p. 155-164.

Frequently cases of severe corrosion are encountered with equipment fabrication of nonferrous alloys long considered standard for handling or processing a specific chemical. Modified techniques for examination reveal, in most cases, presence of mercury in either the corrosion products, or on the metal surface in the vicinity of the attack, or in the environment. A series of studies was made on the role of mercury and its compounds in promoting corrosion of metals, concentration levels that cause serious attack, and manner by which such substances can be transported through chemical equipment and plants. Concentrations of Hg compounds as low as 0.5 ppm. constitute a serious corrosion hazard for a variety of metals and alloys. Numerous diagrams, graphs, tables, micrographs, and macrographs. (R6, Hg, EG-a)

363-R. Prevention of Standby Corrosion in Power Plants. Leonard Highley, Jr., and W. R. Schnarrenberger. *Corrosion* (Technical Section), v. 8, May 1952, p. 171-176; disc., p. 176-177.

A number of case histories illustrate the complexity of the problem. These describe damage to boilers, superheaters, and turbines—vital units of power plant equipment. Points which establish the fact that corrosion occurred during periods of standby. A number of practical preventive measures include both dry and wet procedures. (R4, ST)

364-R. The Corrosion of Copper and of Metals in Bi-Metallic Systems. George Richard Hill. *Corrosion* (Technical Section), v. 8, May 1952, p. 188-191.

Results of experiments in the Fuel Technology Dept., University of Utah, into the kinetics of initial corrosion of Cu in aerated salt solutions. Quick formation of a film inhibits corrosion. Theoretical considerations in corrosion of an Fe-Cu couple. 12 ref. (R5, Cu, Fe)

365-R. Results of 2-Year Sheet Metal Corrosion Tests Are Given. *Corrosion.* (News Section), v. 8, July 1952, p. 10-11.

See abstract of "Atmospheric Exposure Tests of Nailed Sheet Metal Building Materials", Theodore H. Orem, *National Bureau of Standards,* Building Materials and Structures Report 128; item 317-R, 1952. (R3, K13, Al, Zn, ST)

366-R. Aluminum Alloys for Offshore Pipe Lines. Edward T. Wanderer and Donald O. Sprowls. *Corrosion.* (Technical Section), v. 8, July 1952, p. 227-233.

Results of various corrosion tests including effects on tensile properties. Inert-gas metal-arc welding procedure used. Typical tensile properties and compositions of some Al alloys. (R4, K1, Q27, Al, SG-g)

367-R. A Hydrogen Evolution Method for Evaluation of Corrosion Inhibitors for Oil Wells. Willard R. Scott and Gibson H. Rohrback. *Corrosion.* (Technical Section), v. 8, July 1952, p. 234-240.

Method developed to simulate oil-well corrosion, using hot brine and flow conditions and with provision for inhibitor addition. Evaluation procedure and typical test results. SAE 1015 steel was used in the form of coupons. Apparatus diagrams, graphs, tables, and photograph. (R10, CN)

368-R. Vigilance Underground. Byran Patterson. *Corrosion.* (Technical Section), v. 8, July 1952, p. 241-246, disc. p. 246.

Current practices of providing insulation and protection against electrochemical corrosion of buried pipe lines. 24 ref. (R10)

369-R. Some Observations of the Potentials of Stainless Steels in Flowing Sea Water. K. M. Huston and R. B. Teel. *Corrosion.* (Technical Section), v. 8, July 1952, p. 251-256.

Potentials of nine standard grades and three new grades of stainless steel. Effects of heat treatment, free-machining element, and crevice corrosion on emf. potentials. The relation of these potentials to those of yellow brass, Ti, Inconel, and Monel. Testing setup. Tables and graphs. (R4, R2, SS, Cu, Ni)

370-R. Cathodic Protection Against Corrosion of Heating and Plumbing Equipment. T. W. Reynolds. *Heating and Ventilating,* v. 49, Mar. 1952, p. 83-94.

A comprehensive report. Schematic diagrams. (R10)

371-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 44, July 1952, p. 71A-72A, 74A.

Corrosion resistance of Ta, Cb, Zr, W, and Mo metals. Tables. (R general, Ta, Cb, Zr, W, Mo)

372-R. Highly Alloyed Stainless Has More Acid Resistance. Helmut Thielsch and W. E. Pratt. *Iron Age,* v. 170, July 10, 1952, p. 135-139.

Resistance to H_2SO_4. Results of corrosion tests. Effects of chemical and phase composition on corrosion, and composition of a number of commercial Cu-bearing stainless steels with high Ni-Cr content. Briefly mentions grain structure. Table, graphs, and micrographs. 11 ref. (R5, M27, SS)

373-R. Some Notes on Corrosion. H. L. Rice. *Paint and Varnish Production,* v. 43, July 1952, p. 27, 52-53.

Causes of corrosion; electrolytic theory; and nonpolar materials. (R1)

374-R. Some Problems of Corrosion in the Steel Industry. Herbert L. Coe. *Steel Equipment & News,* v. 5, June 1952, p. 7-10.

(R general, ST)

375-R. Aluminum Alloy Dock Pilings Prove Immune to Salt Water. Gilbert S. Schaller. *Western Metals,* v. 10, June 1952, p. 53.

Use of Al alloy beams in dock pilings. They have proven to be corrosion and barnacle-resistant. (R1, R4, Al)

376-R. (Book—Japanese). **Electrolysis Control Handbook.** (Denshoku Boshi Hand Book). Rev. Ed. 466 pages. 1952. Institute of Electrical Engineers of Japan, Tokyo. 600 Yen.

Modern theories and practices concerning electrolysis control. Practical examples and tabulated data. Statistics on corrosion damage to communication and power cables in Japan; theory of underground corrosion; analysis of stray-current distribution from railways; rail bonding; railway current feeding systems; measurement of stray currents; cable sheath and pipeline currents. Material on chemical analysis of earth, underground water, and deposits on corroded metals; methods of mitigating corrosion on lead sheaths and pipe lines; cathodic protection, inhibitors; protective coverings; estimating corrosivity of underground water; and recommended specifications for cable sheaths. Current governmental regulations to protect underground structures and examples of similar regulations in other countries. (R9, R10)

377-R. (Book). **Korrosionstabellen metallischer Werkstoffe geordnet nach angreifenden Stoffen.** (Corrosion Tables of Metallic Materials Arranged According to the Materials Attacked.) Ed. 3. Franze Ritter. 283 pages. 1952. Springer-Verlag, Vienna, Austria.

Includes classified list of 991 references from which the data were obtained. (R general)

S

INSPECTION AND CONTROL

309-S. Report of Committee A-1 on Steel. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 85-106.

Previously abstracted from Preprint 2. See item 271-S, 1951. (S22, CN, AY)

310-S. Report of Committee B-1 on Wires for Electrical Conductors. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 133-143.

Previously abstracted from Preprint 7. See item 273-S, 1951. (S22, T1, Cu)

311-S. Report of Committee B-5 on Copper and Copper Alloys, Cast and Wrought. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 147-166.

Previously abstracted from Preprint 10. See item 274-S. (S22, Cu)

312-S. Report of Committee E-3 on Chemical Analysis of Metals. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 478-481.

Recommendations on revisions of standards and practices; activities of divisions and subcommittees. (S11)

313-S. Report of Committee A-1 on Steel. *American Society for Testing Materials,* Preprint 2, 1952, 45 pages.

Recommendations affecting standards and specifications. Mechanical testing of structural steel. Specifications for heavy-walled carbon and low-alloy steel castings for steam turbines; for 5% Cr, 0.5% Mo steel plates for boilers and pressure vessels; for alloy steel bars for nitriding; for electric fusion welded austenitic Cr-Ni alloy steel pipe for high-temperature service; and for carbon and alloy steel forgings for rings for reduction gears. (S22, Q general, ST)

314-S. Report of Committee A-3 on Cast Iron. *American Society for Testing Materials,* Preprint 3, 1952, 5 pages.

Includes proposed tentative specifications for chilled and white-iron castings. (S22, CI)

315-S. Report of Committee B-5 on Copper and Copper Alloys, Cast and Wrought. *American Society for Testing Materials,* Preprint 11, 1952, 18 pages.

General recommendations affecting standards and specifications. Proposed tentative specification for rectangular copper wire for general purposes and for Cu-base-alloy centrifugal castings. (S22, Cu)

316-S. Report of Committee B-7 on Light Metals and Alloys, Cast and Wrought. *American Society for Testing Materials,* Preprint 13, 1952, 30 pages.

Recommendations affecting standards and specifications. Proposed tentative recommended practice for codification of light metals and alloys, cast and wrought; proposed tentative specifications for Al and Al-alloy pipe, tube, rod, bars, shapes, sheet, and plate for pressure-vessel applications; and for Al bars for electrical purposes. (S22, Al)

317-S. Spectrophotometric Determination of Nickel in Steel With Potassium Dithiooxalate. J. P. Mehlig and B. J. Newby. *Chemist Analyst,* v. 41, June 1952, p. 28-31.

Method was developed for the above determination which involves separation by dimethylglyoxime, conversion of the precipitate into the nickelo-dithiooxalate complex, and spectrophotometric measurement of the light transmitted by the latter solution. 10 ref. (S11, Ni, ST)

318-S. Bismuth Thermocouples. Alvin B. Kaufman. *Instruments,* v. 25, June 1952, p. 762, 802-803.

Properties and applications of ductile Bi and Bi-alloy thermocouples, especially in the low-temperature range. Practical directions for preparation of junctions and for use. (S16, P15, Bi, SG-a)

319-S. How a Small Shop Uses Quality Control. Don Spath. *Iron Age,* v. 169, June 19, 1952, p. 143-146.

Quality control methods used at General Products Corp., Jackson, Mich., a small contract machine shop. (S12)

320-S. Beta Gage Measures Strip Thickness. *Iron Age,* v. 169, June 19, 1952, p. 149.

Brief description of instrument which furnishes an automatic record. (S14)

321-S. Inspection of Electroplated Aircraft Parts. P. Skeggs. *Journal of the Electrodepositors' Technical Society,* v. 28, 1952, p. 15-26. (Preprint.)

The general inspectional requirements of D.T.D. specifications covering plating of aircraft parts. Stamping and methods of testing generally; and the particular requirements of certain specifications. Surface treatment of Zn and Cd coatings. (S13, L general, Zn, Cd)

322-S. Arc Spectra of Gallium, Indium, and Thallium. William F. Meggers and Robert J. Murphy. *Journal of Research of the National Bureau of Standards,* v. 48, Apr. 1952, p. 334-344.

Systematically investigated photographically in the octave 6500 to 13,000 Å. The spectra were excited in d.c. arcs and recorded on infrared-sensitive photographic emulsions with a concave diffraction grating 22 ft. in radius. 17 ref. (S11, Ga, In, Tl)

323-S. Power Supply for a Thermionic Ion Source. C. Reuterswärd. *Journal of Scientific Instruments,* v. 29, June 1952, p. 184-185.

Characteristics and details of a regulated a.c. generator, by means of which ion currents constant to some tenths of a percent are obtained for mass spectroscopic investigations. Background and operational information. Circuit diagram. (S11)

324-S. Apparatus for Conversion of Infra-Red Spectrometer Records to Percentage Transmission. R. A. G. Carrington and J. G. Reynolds. *Journal of Scientific Instruments,* v. 29, June 1952, p. 197-199.

Photographs and charts. (S11)

325-S. A Torsion Balance for Weighing Evaporated Films. P. L. Clegg and A. W. Crook. *Journal of Scientific Instruments,* v. 29, June 1952, p. 201-203.

Balance which works within a vacuum chamber. Used in thickness measurement of metal films. (S14)

326-S. Specifications Relating to Aluminium and Magnesium. *Light Metals,* v. 15, June 1952, p. 202-203.

A revised list of British specifications. (S22, Al, Mg)

327-S. Ultrasonic Inspection Checks Quality of Brazed Joints. H. Greenberg. *Materials & Methods,* v. 35, June 1952, p. 102-105.

How good correlation between shear testing and ultrasonic inspection resulted in adoption of this nondestructive test method for brazed circuit-breaker contacts. Cupaloy (99.5% Cu + 0.5% Cr) is brazed to 65% W + 35% Ag. Correlation chart, oscillograms, and a table of advantages and disadvantages. (S13, K8, Cu, W)

328-S. Boron and Tentative Standard Steels. *Metal Progress,* v. 67, June 1952, p. 96-B.

Tabulation of AISI compositions issued Mar. 25, 1952. (S22, AY)

329-S. Various Inspection Methods Used in Heat Treating Shops. Stanley A. Gill. *Metal Treating,* v. 3, May-June 1952, p. 9-11.

Nondestructive test methods developed by Magnaflux Corp.: magnetic-particle inspection; and fluorescent penetrant usage. (S13, J general)

330-S. A Resume of the Ship Fracture Problem. Finn Jonassen. *Welding Journal,* v. 31, June 1952, p. 316s-318s.

Work of the Ship Structure Committee has led to major improvements in existing ships and points the way for better steels, fabricating procedures, and design in new construction. (S21, ST)

331-S. (English.) An Apparatus for Quantitative Spectrographic Analysis in Controlled Atmospheres. R. St. J. Emery. *Spectrochimica Acta,* v. 4, no. 6, 1952, p. 513-515.

Apparatus enabling small samples of metal to be analyzed spectrographically in any selected single gas or mixture of gases. The apparatus may also be used for analysis at reduced pressures. (S11)

332-S. (French.) Inspection of Castings by Means of Gamma Rays. Albert Blondel. *Fonderie,* May 1952, p. 2938-2944.

Various radiographic devices, and technique of operation using gamma rays. Tables, graphs, photographs, and radiographs. (S13)

333-S. (French.) Spectrochemical Analysis of Steelmaking Slags. René Castro and René Loude. *Spectrochimica Acta,* v. 4, no. 6, 1952, p. 496-512.

Standard samples were prepared by sintering mixtures of the constituents in definite proportions. These sintered standards give similar spectra to those obtained from fused slags of the same composition; and have therefore made it possible to explore the effect of interfering elements on others and to complete a range of standard samples corresponding to the normally made slags. Two methods of carrying out the analysis; in each the samples are made of pressed pellets of a mixture of the slag with Ni powder. (S11, B21)

334-S. Report of Committee B-2 on Non-Ferrous Metals and Alloys. *American Society for Testing Materials,* Preprint 9, 1952, 11 pages.

Proposed tentative specifications for iodide titanium, titanium strip, sheet, plate, bar, tube, rod, and wire, and titanium ingot. (S22, Ti)

335-S. Report of Committee B-4 on Electrical Heating, Resistance, and Related Alloys. *American Society for Testing Materials,* Preprint 10, 1952, 38 pages.

Recommended revisions of specifications, standards, and test methods. Chemical analysis of electronic Ni. Tests for thermionic-emission properties of electron-tube materials, and for sag of tungsten wire. Specifications for high-resistivity, low-temperature-coefficient wire, and for round Cr-Cu wire for electronic devices. (S22, P15, SG-q)

336-S. Spectrophotometric Determination of Titanium With Ascorbic Acid. Edward Hines and D. F. Boltz. *Analytical Chemistry,* v. 24, June 1952, p. 947-948.

Method suitable for the determination of 0.1-25 p.p.m. Ti. Spectrogram and table. 15 ref. (S11, Ti)

337-S. Spectrophotometric Determination of Palladium With Bromide. Gilbert H. Ayres and Bartholomew L. Tuffly. *Analytical Chemistry,* v. 24, June 1952, p. 949-952.

Method which should be especially suitable for analysis of high-Pd alloys. Optimum range is about 40-200 p.p.m. of Pd. Spectrogram and tables. 10 ref. (S11, Pd)

338-S. Attainment of High Resolution in X-Ray Fluorescent Analysis. Ruben M. Brissey. *Analytical Chemistry,* v. 24, June 1952, p. 1034-1035.

A simplified method using a General Electric XRD-3 fluorescent analyzer applicable when elements, such as mixtures of Mo, Cb, Ta, and W, are analyzed. Tables and radiation curves. (S11, Mo, Cb, Ta, W)

339-S. Photometric Determination of Beryllium in Beryllium-Copper Alloys. C. L. Luke and Mary E. Campbell. *Analytical Chemistry,* v. 24, June 1952, p. 1056-1057.

Method for 2% Be-Cu alloys using ethylene-diamine tetra-acetic acid as a masking agent and an aluminon-buffer composite solution. Tables. (S11, Be, Cu)

340-S. Surface Finish. P. E. Dyachenko. *Industrial Diamond Review,* new ser., v. 12, June 1952, p. 111-114. (Reprinted from *Courrier de la Normalisation,* v. 16(87), 1949, p. 279-283.)

Survey of Russian apparatus and

procedures for surface-finish measurements. Diagrams, graphs, and illustrations. (S15)

341-S. On the Arc Spectra of Boron, Indium, Thallium, Lead, and Bismuth. H. E. Clearman. *Journal of the Optical Society of America*, v. 42, June 1952, p. 373-379.

Observations were made between 1200-2000 A.
(S11, B, In, Tl, Pb, Bi)

342-S. Miniature Radiography. S. L. Fry. *Metal Industry*, v. 80, June 13, 1952, p. 479-480.

A method of cutting costs of X-ray examination. A small-size photograph is taken of a fluorescent screen the same size as the specimen. (S13)

343-S. A Recording Device for Surface Temperature Measurements. Nobuji Sasaki and Akira Kamada. *Review of Scientific Instruments*, v. 23, June 1952, p. 261-263.

The device itself; the 2-point thermocouple; and the portable thermostat. Diagrams. (S16)

344-S. New Precision Reference Specimens for Surface Finish Control. C. R. Lewis and A. F. Underwood. *Tool Engineer*, v. 29, July 1952, p. 36-40.

Development of a method of standardization of production and distribution of accurate and reproducible physical standards of surface roughness. Design and machining of specimens. Specimens now available commercially. Diagrams and photographs. (S15)

345-S. How Big Is Your Inch? W. D. Russell. *Western Machinery and Steel World*, v. 43, June 1952, p. 99-101.

Standardization in gaging. Advocates use of an area agency for this purpose. Precision Gage Laboratory at Stanford Research Institute. (S14, S22)

346-S. (English.) **Analytical Application of the Absorption Spectra of the Halide Complexes of Heavy Metals. I. Spectrophotometric Determination of Iron With Hydrochloric Acid.** M. A. Desesa and L. B. Rogers. *Analytica Chimica Acta*, v. 6, June 1952, p. 534-541.

12 references. (S11, Fe)

347-S. (French.) **Sorting of Steels by the Spark Method.** Maillet and Couronne. *Circulaire d'Informations Techniques*, v. 9, June 1952, p. 836-843.

The method and its application to the determination of quality of special steels. Results on highly mild, mild, semi-hard, hard, and very hard steels, also those on Mn, Si, Ni, Cr, Ni-Cr, W, and V steels. Micrographs. (S10, ST)

348-S. (German.) **A Rapid Method for Determination of the Chemical Content of Metallurgical Slags by Means of Spectroscopic Analysis.** Gerhard Hartleif and Heinz Kornfeld. *Archiv für das Eisenhuttenwesen*, v. 23, Mar./Apr. 1952, p. 107-110; disc., p. 110-111.

Spectroscopic method for determination of Ca, Fe, Mn, Mg, Al, Ti, V, and Si in furnace slag. Details of the experiments and amount of error. Tables and graphs.
(S11, B21)

349-S. (German.) **Testing of Material With Gamma and Beta Rays. I. Radioactive Materials and Their Physical Properties.** E. A. W. Müller. *Archiv für Technisches Messen*, June 1952, p. 127-130.

On the basis of the literature. Natural and synthetic radioactive materials. Table gives properties of isotopes applicable to testing of materials. 49 ref. (S19)

350-S. (German.) **Industrial Measurement of Elevated Temperatures in Molten Metals. Salts, and Slags.** H. v. Zeppelin. *Giesserei*, v. 39, June 12, 1952, p. 287-289.

Relative merits of various methods and apparatus, especially various protective casings, such as quartz, Ni, and water-cooled types. Diagrams. (S16)

351-S. (German.) **Spectro-Analytical Determination of Low Silver Contents in Lead.** W. D. Treadwell, E. Amrein, and A. E. R. Bodmer. *Helvetica Chimica Acta*, v. 35, No. 3, 1952, p. 765-770.

Results of experiments show that aging the Ag-Pb alloys greatly reduces the blackening values and the hardness of the alloys. Observed phenomena are explained and data are charted. (S11, Pb)

352-S. (German.) **Results Obtained by Ultrasonic Testing of Heavy Forgings Using the Impulse-Reflection Method.** Rudolf Schinn and Ursula Wolff. *Stahl und Eisen*, v. 72, June 5, 1952, p. 695-701; disc., p. 701-702.

12 references. (S13, ST)

353-S. (English.) **A Light-Profile Microscope for Surface Studies.** S. Tolansky. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie*, v. 56, Apr. 1952, p. 263-267; disc., p. 267.

New microscope technique which permits rapid study of topography of metal and crystal surfaces. The technique is a development of the familiar Schmaltz light-cut method and gives profile magnifications of up to 2000X with resolution of the order of 0.25 μ. The method gives topography over a complete area with a single photograph and is easy to use. It is recommended for use for structures which are too coarse for precision interferometry. (S15)

354-S. (German.) **An Indirect Regulator for Electric Furnaces.** Franz Eberhard Wittig. *Zeitschrift für Metallkunde*, v. 43, May 1952, p. 161-162.

Describes and diagrams device mentioned in preceding article. Its limit of error is 1%. The regulator can also be used with the SiC tube furnace. (S16)

355-S. (German.) **Theoretical and Experimental Basis of the Nondestructive Testing of Materials by Means of the Eddy-Current Process. I. The Contact Coil Process.** Fritz Förster. **II. Practical Results and Industrial Applications of the Contact Coil Process.** Fritz Förster and Helmut Breitfeld. *Zeitschrift für Metallkunde*, v. 43, May 1952, p. 163-180.

The process and a device developed on the principle of the contact coil. Detailed data on extent of the measurements, their accuracy, and sensitivity of the device, possibilities of application of the process, and experiences with it in industry. Charts, tables, diagrams, micrographs, and photographs. 16 ref. (S13)

356-S. (German.) **An Interference Process for Investigating Rough Surfaces.** Ernst Zehender. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, May 21, 1952, p. 456-458.

Roughnesses below one micron can be measured by supplementing the interference microscope by the imprint film-immersion process. Diagrams and interference pictures. (S15)

357-S. (Russian.) **Determination of Phosphorus in Steels by the "Steeloscope".** E. S. Kudelia and A. S. Dem'ianchak. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Mar. 21, 1952, p. 397-398.

A method for spectographic analysis of phosphorus in steel and cast iron. (S11, ST, CI)

358-S. The Separation and Analysis of Metallic Carbides From Steel. R. Pemberton. *Analyst*, v. 77, June 1952, p. 287-291; disc., p. 291-292.

A technique for isolating the carbide phase from solutions of highly alloyed steels, and methods for determining the elemental composition of the separated residue. Procedures for determination of C, Mn, Cr, V, Mo, W, Ti, Cr, and Fe in the residue. (S11, AY, C-n)

359-S. Inorganic Chromatography on Cellulose. Part VIII. The Use of a "Compound" Column of Alumina and Cellulose for the Determination of Uranium in Minerals and Ores Containing Arsenic and Molybdenum. W. Ryan and A. F. Williams. **Part IX. The Use of Alumina and Cellulose Adsorbents for the Determination of Thorium and the Simultaneous Determination of Thorium and Uranium in Minerals and Ores.** A. F. Williams. **Part X. The Spectrographic Determination of Micro Quantities of Thorium Separated by Chromatography From Minerals and Ores.** G. W. Kingsbury and R. B. F. Temple. *Analyst*, v. 77, June 1952, p. 293-312; disc., p. 312.

Tables. 19 ref. (S11, U, Th)

360-S. New Standard Consolidates Bolt and Nut Dimensions. *Machine Design*, v. 24, July 1952, p. 129-130.

Lists important changes. With the exception of heavy bolts, head dimensions of all former series of hexagon bolts and cap-screws were consolidated into a single dimensional series. (S22, T7)

361-S. Gauges for Jet Propulsion Unit Turbine Blades. E. J. Pirner. *Machinery* (London), v. 81, July 3, 1952, p. 14-19.

Gages built for Fairchild Engine Div., Fairchild Engine & Airplane Corp., by Daco Machine & Tool Co., Brooklyn, N. Y. (S14)

362-S. Rapid Photometric Determination of Cobalt in Aluminium Alloys Using Nitroso-R-Salt. William Stross and Gertrude Stross. *Metallurgia*, v. 45, June 1952, p. 315-318.

The method of Haywood and Wood for determining Co in steel can be applied to Al alloys with only minor adjustments. An even simpler procedure also has the advantage of enabling the determination of Co to be combined with that of Cu, Ni, and Fe from aliquots of the same metal solution. Calibration graph. 20 ref. (S11, Co, Al)

363-S. Analysis of Silver Solder. R. W. C. Broadbank. *Metallurgia*, v. 45, June 1952, p. 321.

Electrodeposition method for determination of Ag, Cu, Cd, and Zn. First three are deposited from perchloric acid solution. Table.
(S11, SG-f, Ag, Cu, Cd, Zn)

364-S. High Speed Photography; Steel Research Tool. R. A. Buchanan, *Steel*, v. 131, July 7, 1952, p. 90-91.

Various applications, including blast-furnace combustion zones, openhearth tapping streams, piercing of seamless tubing, and oil and spray quenching. Recommended photographic technique. (S18, St)

365-S. (Book) **Inspection and Gauging.** C. W. Kennedy. 502 pages. Industrial Press, Machinery Publishing Co., Ltd., National House, West Street, Brighton 1, England. 65s.

Practically every aspect of inspection is covered. Types of gages and modern inspection equipment, specifications of workpieces, tolerances, and the inspection of special types of workpieces such as screw threads. Quality control, sampling, and process inspection. (S14)

366-S. (Book). **1951 Supplement to Book of ASTM Standards. Part I. Ferrous Metals.** 416 pages. American Society for Testing Materials. 1916 Race Street, Philadelphia 3. $3.50.

Includes 54 standards covering steel piping materials, structural steel and plate, bars and bolting materials, music wire and alloy bars for springs, corrosion and heat resisting steel, metal-coated steel

products, cast and malleable iron, and general testing methods. (S22, CI, ST)

337-S. (Book). 1951 Supplement to Book of ASTM Standards. Part II: Non-Ferrous Metals. 360 pages. American Society for Testing Materials, 1916 Race St., Philadelphia 3. $3.50.

Covers Cu and Cu alloys, Al and Mg alloys for castings, metal powders and products, electrical resistance alloys, materials for radio tubes, thermostat metals, electrodeposited coatings, and general testing methods. (S22, EG-a, SG-g)

338-S. (Book). 1952 SAE Handbook. 946 pages. 1952. Society of Automotive Engineers, 29 West 39 St., New York 18, N. Y.

Main sections cover steels and iron; nonferrous metals; nonmetallic materials; threads; bolts, nuts, and screws; splines and serrations; bearings; springs; tubing and fittings; electrical equipment; lighting equipment; engines and parts; car, truck, and bus equipment; tractors and earthmovers; and marine equipment. Includes index. (S22)

T

APPLICATIONS OF METALS IN EQUIPMENT

339-T. Use of Needle Tubing Extended to Mechanical Applications. *Materials & Methods,* v. 35, June 1952, p. 106-108.

Mechanical properties of Type 304 stainless steel hypodermic needle tubing, and a summary of new uses, both surgical and mechanical. (T10, Q general, SS)

340-T. High Temperature Fastening Problem Solved With Special Self-Locking Nuts. Charles F. Faroni. *Materials & Methods,* v. 35, June 1952, p. 109-111.

How proper materials selection and new design resulted in fasteners that can withstand vibration at temperatures to 1200° F. On the basis of all-around performance, an 18-10 Cr-Ni stainless steel (Cb-stabilized and Se-modified) was selected. Tendency to "cold-weld" was overcome by use of Ag plate, which acts as a lubricant. Specific use is in a turbojet engine. (T7, K13, SS, Ag)

341-T. Iron Powder Materials in High Frequency Transformers for Military Equipment. H. W. Lord. *Metal Powder Association,* "Proceedings, Seventh Annual Meeting", 1951, p. 22-28; disc., p. 28-29.

Properties and design of the transformers. Advantages of ferrite cores over iron-powder cores. (T1, Fe)

342-T. Metal Powders in Some Small Arms Ammunition Applications. G. A. Miller, Jr. *Metal Powder Association,* "Proceedings, Seventh Annual Meeting", 1951, p. 30-38; disc., p. 38-40.

Experiments on use of powdered Fe in various projectiles, including small-calibre bullets, shells, armor-piercing cores, fuze parts, etc. Diagrams and illustrations. (T2, H general, Fe)

343-T. Metal Powder Applications in the Home Appliance Field. J. D. Carey. *Metal Powder Association,* "Proceedings, Seventh Annual Meeting", 1951, p. 68-76; disc., p. 76-77.

An illustrated survey, with emphasis on G.E. appliances. (T10)

344-T. Type 430 Stainless for Roof Drainage. Richard E. Paret. *Sheet Metal Worker,* v. 43, June 1952, p. 37-38, 79, 82.

Reviews some installations of straight Cr stainless steel which have been in service for a number of years; and current installations in the residential field. Fabrication techniques in manufacture of stainless roof-drainage equipment. (T26, G general, SS)

345-T. Radiant Oven Adapts to Job. *Steel,* v. 130, June 23, 1952, p. 77.

Radiant infrared oven panels for use in work which requires crowding heat in a limited space. Advantages. (T5)

346-T. Cleanliness Is Their Business. George Laycock. *Steelways,* v. 8, May 1952, p. 8-10.

The use of steel, especially stainless steel, in the soap-making industry. (T29, ST, SS)

347-T. (Czech.) Alpha Beryllium Copper for Springs. Ivan Cerkesov. *Hutnické Listy,* v. 7, Mar. 1952, p. 115-120; Apr. 1952, p. 186-190.

Production, fabrication, and mechanical properties. Tables and graphs. (T7, Cu, SG-b)

348-T. (French and German.) The Development of Aluminum Windows in Switzerland. M. Spescha. *Aluminium Suisse,* v. 2, May 1952, p. 75-79.

Manufacturing processes and various examples of use. (T26, Al)

349-T. (French and German.) The Influence of the Use of Light Metals Upon Ship Construction and Assembly. H. E. Jaeger. *Aluminium Suisse,* v. 2, May 1952, p. 80-90.

Difficulties presented by the use of light metals in construction. Selection of material from the point of view of corrosion resistance, the size necessary, and problems of assembly. Data are tabulated. 16 ref. (T22, Al, Mg)

350-T. (French and German.) "Fairmile" Aluminum Barges. *Aluminium Suisse,* v. 2, May 1952, p. 92-93.

Manufactured by a British firm. Details of construction and advantages. Table contains comparative data on light metal and steel barges. (T22, Al)

351-T. (French and German.) Dam Guards of Aluminum. *Aluminium Suisse,* v. 2, May 1952, p. 94-95.

On the Thames in England. (T4, Al)

352-T. (French and German.) Aluminum in Hospitals. *Aluminium Suisse,* v. 2, May 1952, p. 100-101.

Varied applications. (T10, Al)

353-T. (French and German.) Aluminum in Church Architecture. *Aluminium Suisse,* v. 2, May 1952, p. 102-103.

Structural details of an Italian church tower made of Al, and hoisted into place in one piece. (T26, Al)

354-T. (German.) Aluminum Roof on the Westfalen Hall in Dortmund. H. Kentzler and J. Schroeder. *Aluminium,* v. 28, Apr. 1952, p. 121-123. (T26, Al)

355-T. The Cost of Titanium-Alloy Advantages. *Aviation Week,* v. 56, June 30, 1952, p. 21-22, 24-26, 29, 32.

See abstract of "Titanium in Aero-Engine Construction", by H. H. Hanink, *Aeroplane;* item 273-T, 1952. (T24, Q general, Ti)

356-T. Permanent Magnets for Spectrographs and Nuclear Physical Research. D. Hadfield and D. L. Mawson. *British Journal of Applied Physics,* v. 3, June 1952, p. 199-202.

Some advantages of the permanent and electropermanent magnet over the electromagnet. Applications to various branches of particle research. Early and recent designs. Graphs and drawings. (T8, P16, SG-n)

357-T. Wider Design Opportunities With the New Phenolics. Part II. Alex E. Javitz. *Electrical Manufacturing,* v. 50, July 1952, p. 102-107, 264, 266, 268.

Laminate types are low-loss; Al and Cu clad; postformed; low-pressure; and alkali resistant. Properties and applications. Bonding of the metal-clad laminates. Tables and photographs. (To be continued.) (T1, K11, Al, Cu)

358-T. Electronic Components in Great Britain. *Electrical Manufacturing,* v. 50, July 1952, p. 118-120.

New developments including metal-film resistors, ferrites, semiconductors, and subminiaturization. Mentions a Au-Ag alloy film resistor built up on paper by photomechanical techniques and a Sn-Sb oxide film resistor. (T1, Au, Ag, Sn)

359-T. Recent French Developments in Lime-Ferritic Electrodes. *Foote Prints,* v. 24, No. 1, 1952, p. 19-22.

Information derived from a booklet published by Sarazin & Cie, one of the principal welding-electrode manufacturers in France. (T5)

360-T. What's Different About Cable Connectors for Aluminum Conductors? Francis A. Westbrook. *Industry and Power,* v. 63, July 1952, p. 91-92.

Expansion, hardness of material, corrosion, and size are all factors which may contribute to slow deterioration of the connection and cause future trouble. (T1, Al)

361-T. High-Temperature Alloys in Relation to Gas-Turbine Design. K. L. Buckle. *Institution of Mechanical Engineers, Proceedings,* sec. A, v. 166, No. 1, 1952, p. 123-30.

Discussion is limited to the combustion and expansion sections of the gas turbine. Significant mechanical properties of different high-temperature alloys, as well as ceramics. Examples of fatigue and creep failure. Fabrication characteristics and problems. Data are charted. (T25, Q general, SG-h)

362-T. Conservation of and/or Substitution for Critical Jet Engine Materials. N. E. Promisel. *Journal of Metals,* v. 4, July 1952, p. 698-702.

Major factors to be considered in determining the classification of a material as critical. Critical jet-engine materials; conservation; new basic materials; and other conservation approaches. (T25, SG-h)

363-T. Aluminum Goes to Sea—a New Era in Shipbuilding. Arthur Q. Smith. *Light Metal Age,* June 1952, p. 12-13, 33.

Extensive use of Al and alloys in the new S. S. United States. (T22, Al)

364-T. Aluminum Alloys in Civil Engineering Practice. Part 2. Prefabrication. S. K. Ghaswala. *Light Metal Age,* June 1952, p. 17, 27, 32.

Structural applications. Prefabrication methods. Comparison of mechanical properties with those of steel. Atmospheric and chemical corrosion resistance. (T4, Q general, R general, Al)

365-T. The Current Status of the Aluminum Auto Radiator. J. R. Holmes. *Modern Metals,* v. 8, June 1952, p. 33-34.

Major technical problems being encountered in the development of the Al radiator at Harrison Radiator Div., General Motors Corp., include high cost, welding and brazing difficulties, and others. (T21, K general, Al)

366-T. The Use of Aluminum Transmission Lines in Switzerland. R. Voegeli. *Modern Metals,* v. 8, June 1952, p. 36, 38.

Examples of use of Al conductors. Design considerations. Economic advantages of Al conductors for various voltages up to 380 kv. (T1, Al)

367-T. (English.) Corrosion-Resistant Steels and Their Application as Liner Material in the Chemical Indus-

try, and in the Petroleum Industry in Particular. J. H. Van Swaal. *Metalen*, v. 7, Apr. 30, 1952, p. 137-143; May 31, 1952, p. 173-177.

Relative merits of different types of steels. Transformations, phase relationships, welding effects, heat treatment, embrittlement, and other properties. Part 2: Manufacture of clad steel by casting, fusion, arc welding, spot welding, etc. Macrographs, diagrams, tables, and graphs.
(T29, L22, K general, SG-g, ST)

368-T. (French.) **The Manufacture and Maintenance of Steel Chains.** Louis Gascuel. *Métallurgie et la Construction mécanique*, v. 84, May 1952, p. 347, 349-351, 353.

Manufacturing processes for handwrought chains, the various welding processes, and the manufacture of rolled, nonwelded chains. A special process for the hardening of chains, and their care during use. Diagrams.
(T7, G6, K general, J26, CN)

369-T. (French.) **The Problem of Heat Resistant Alloys in Automobile Construction.** H. Godfroid. *Métaux: Corrosion—Industries*, v. 27, Apr. 1952, p. 158-159.

The properties necessary for alloys used in automobile and airplane construction. Various alloys and their roles in specialized uses.
(T21, SG-h)

370-T. (French.) **Problems in the Application of Refractory Materials in Reaction Motors.** R. Fleury. *Métaux: Corrosion—Industries*, v. 27, Apr. 1952, p. 160-163.

Reviews fundamental problems, such as the construction of turbine blades, turbine disks, necessary control tests, and thermal treatment.
(T25, SG-h)

371-T. (German.) **Present Possibilities and Limitations in the Use of Light Metals in Shipbuilding.** E. Foerster. *Aluminium*, v. 28, June 1952, p. 177-181.

Technical and economic factors. The stability problem. (T22, Al, Mg)

372-T. (German.) **Recommendations for Selection and Processing of Aluminum Materials in Shipbuilding.** J. Reiprich. *Aluminium*, v. 28, June 1952, p. 181-183.

Includes table of ships of various countries, showing, for each, applications of Al and its alloys.
(T22, Al)

373-T. (German.) **Aluminum Materials in Shipbuilding.** J. Reiprich. *Aluminium*, v. 28, June 1952, p. 184-186.

Comprehensive tabular presentation of Al alloy compositions, physical and mechanical properties. Alloy designations in the different countries. (T22, S22, Al)

374-T. (German.) **Light Metals in Italian Shipbuilding.** R. Struss. *Aluminium*, v. 28, June 1952, p. 187-190.

An illustrated survey. (T22, Al)

375-T. (German.) **Light-Metal Patrol Boats.** A. Pyszka. *Aluminium*, v. 28, June 1952, p. 195-198.

Entire body and superstructure of Rhine patrol boats are made of Al alloy. (T22, Al)

376-T. (German.) **Heat Insulation of Industrial Furnaces.** Ernst Maase. *Gas- und Wasserfach*, v. 93, June 1, 1952, p. 319-323.

Necessity of insulating gas furnaces in the same manner as electric furnaces. Simple methods for deducing the heat losses through the walls, and factors for determining it from diagrams. Data are tabulated. (T5)

377-T. (German.) **Zinc-Alloy Deep Drawing, Stamping, and Blanking Tools.** W. Wolf. *Metall*, v. 6, May 1952, p. 240-243.

Use of zinc alloys, particularly of "Z-430", for these tools. Advantages as compared to steel tools. Diagrams and micrographs.
(T5, G2, G3, G4, Zn, TS)

378-T. (Italian.) **Corrugated Aluminum Sheets for Roofing.** *Alluminio*, v. 21, May 1952, p. 179-199.

Advantages in the use of Al for roofs, such as light weight and corrosion resistance. Graphs and diagrams show details of construction and mechanical properties. Installation process. (T26, Al)

379-T. Tips on Stainless for Aircraft Hydraulics. J. B. Giacobbe. *Aviation Age*, v. 18, July 1952, p. 6-14.

Specifications for tolerances, mechanical properties, cleanliness, etc. Tips on alloy selection, flaring, bending, and burnishing.
(T24, L10, Q general, G6, SS)

380-T. Let's Use Aluminum; Not Abuse It! L. F. Hickernell and L. L. Carter. *Electrical World*, v. 138, July 14, 1952, p. 123-125.

Recommends that logical plan of selective usage be adopted to maintain existing standards of reliability and economics as electrical-supply systems undertake the conversion from Cu to Al. (T1, Al)

381-T. All-Aluminum Use Climbs Cautiously. *Electrical World*, v. 138, July 14, 1952, p. 126-128.

Survey shows widespread trial application of all-aluminum to distribution in small amounts, mostly for services. Graphs. (T1, Al)

382-T. Boston Edison Installs First 15-Kv Aluminum Underground Cable. *Electrical World*, v. 183, July 14, 1952, p. 133-136.
(T1, Al)

383-T. New Aluminum-Body Truck. *Food Engineering*, v. 24, July 1952, p. 90-91.

New lightweight Al-body trucks which are said to have structural and operational advantages.
(T21, Al)

384-T. Factors in Selecting Stainless Steels to Reduce Costs, Improve Performance, and Conserve Critical Alloying Elements. Basil T. Lanphier. *Machine Design*, v. 24, July 1952, p. 112-128.

Compares the distinguishing properties of many stainless steels as an aid to their evaluation for specific applications. Tables of properties and graphs. Photographs illustrate applications of various types.
(T general, Q general, P general, SS)

385-T. Trends in Gas Turbine Engine Materials. *Product Engineering*, v. 23, July 1952, p. 248, 250, 252, 254. (A Condensation.)

See abstract of "Gas Turbine Engine Materials", R. H. Thielemann, J. C. Mertz, and W. P. Eddy, Jr., *Machine Design;* item 168-T, 1952.
(T25, SG-h)

386-T. Aluminum Brazing Sheet Used in Radiator Studies. *Steel*, v. 131, July 7, 1952, p. 96-97.

New Al alloy brazing sheet developed by Alcoa which is expected to find immediate use in automotive radiator development. 3S alloy core has brazing alloy on one side, Alclad on the other. (T21, K8, Al)

387-T. Metal Film Resistors. R. J. Heritage. *Electronic Engineering*, v. 24, July 1952, p. 324-327.

Thin noble-metal films can be used to provide useful resistors of both the fixed and variable types which embody most of the properties expected of high-grade components. Electrical properties, available production methods, and limitations. Experimental fixed and variable resistors made from 60% Au, 40% Pt alloy on glass.
(T1, P15, Au, Pt)

388-T. Non-Ferrous Metals in Locomotives. J. D. Glen. *Metal Industry*, v. 80, June 27, 1952, p. 527-529.

Chief uses of nonferrous metals in the manufacture of locomotives.
(T23, EG-a)

389-T. (Book) **Materials Technology for Electron Tubes.** Walter H. Kohl. 493 pages. Chapman and Hall, Ltd., 37 Essex St., London W.C. 2, England. 80s net.

Sections of interest to metallurgists include those on: important metals; soldering and brazing; and ceramic-metal seals.
(T1, K7, K8, K11)

390-T. (Book) **Wire Ropes in Mines.** 828 pages. Institution of Mining and Metallurgy, Salisbury House, London, E.C. 2, England. $7.

Proceedings of conference held at Ashorne Hill, Leamington Spa, England in 1950. Text of 18 papers, report of the subsequent discussion, and summary of conclusions and recommendations. Metallurgical aspects include manufacturing, properties, and testing. (T28, G general)

V

MATERIALS
General Coverage of Specific Materials

123-V. Some Facts About Gallium: Frenchman Reviews Present Knowledge. *Chemical Age*, v. 66, Apr. 5, 1952, p. 515-516. (Translated and condensed from *Chimie et Industrie*, v. 67, Jan. 1952, p. 45-55.)
(Ga)

124-V. New at B.I.F. 1952: Titanium. *Light Metals*, v. 15, June 1952, p. 192-194.

Exhibit at British Industries Fair. General discussion of Ti and its various properties, stressing corrosion resistance. Large photographic chart shows the relative resistance to corrosion of Ti and other constructional metals. Map shows world distribution of Ti ore deposits.
(R general, B10, Ti)

125-V. Magnesium Alloys. F. A. Fox. *Magnesium Review and Abstracts*, v. 8, Apr. 1952, p. 156-164.

Previously abstracted from *Research*. See item 52-V, 1952. (Mg)

126-V. High Strength Aluminum Alloys. C. Wilson. *Metal Industry*, v. 80, May 23, 1952, p. 419-421; May 30, 1952, p. 445-449.

May 23 issue: Heat treatment, corrosion and extrusion. May 30: Effects of solution and precipitation treatments on mechanical properties. Photographs, tables, and graphs. (Al)

127-V. Non-Magnetic Steel. C. T. Eakin. *Electrical Manufacturing*, v. 50, July 1952, p. 108-112, 268, 270, 272.

Information of four types of alloys available for electrical design. Basic metallurgy responsible for nonmagnetic properties, and various processes and properties. Alloy types are Cr-Ni; C-Mn-Ni; and C-Mn steels; and C-Ni cast irons.
(T1, AY, CI)

128-V. Engineering Properties and Applications of S.G. Iron. A. B. Everest. *Engineer*, v. 193, June 13, 1952, p. 794-795; June 20, 1952, p. 838-840.

Refers to "spheroidal-graphite" or nodular cast iron. Summarizes the latest information on these new irons in engineering practice. Various modifications of the material have been developed. Tables, graphs, and micrographs. 35 ref. (CI)

129-V. Titanium: Big Production Gains. Charles A. Scarlott. *Steel*, v. 130, June 30, 1952, p. 76-79.

General discussion of Ti; mechanical and physical properties, corro-

(Continued on p. 62)

You Should Have For Ready Reference . . .

FOUR OF THE MOST IMPORTANT METALLURGICAL BOOKS OF THE YEAR

Casting of Brass and Bronze

By Daniel R. Hull

Assistant Technical Mgr., The American Brass Co.

Here is an exceedingly important book, written with the searching analysis of metallurgy at its best. Daniel R. Hull puts down both the practical and technical facts about Brass and Bronze casting during the last fifty years.

Casting of Brass and Bronze does more than previous works have done. It vividly traces the development of Brass casting, both from the standpoint of melting practices and the aspects of the problem which are left to the skill of workmen—namely, shape of mold, condition and nature of mold surface, and rate of pour.

The author has made a vital and necessary contribution to one of the oldest of metallurgical processes by bringing it up-to-date.

192 pages . . . 6 x 9 . . . illustrated . . . red cloth . . . $3.50

Mechanical Wear

Edited by John T. Burwell, Jr., *Associate Professor*
Department of Mechanical Engineering
Massachusetts Institute of Technology

Twenty-two men, Americans, British and Dutch, expert in various fields of this complex subject, participated in a summer conference on mechanical wear at M.I.T. organized by Prof. Burwell. This book is a result of that meeting. It contains the original papers and discussion, as well as an inclusive summary of the present status of the problem by the conference's organizer. It is profusely illustrated, adequately indexed, and contains an extensive bibliography of the related literature.

CHAPTER CONTENTS

Chapter 1. Dimensional Considerations in Friction and Wear, by C. Fayette Taylor. Chapter 2. Wear in Diesel Engines, by C. G. A. Rosen. Chapter 3. Wear of Automotive Engines—Cylinders and Rings, by Paul S. Lane. Chapter 4. Fuel and Lubrication Factors in Piston Ring and Cylinder Wear, by A. G. Cattaneo and E. S. Starkman. Chapter 5. Chemical Aspects of Wear and Friction, by R. G. Larsen and C. L. Perry. Chapter 6. The Vapor-Lubrication of Graphite in Relation to Carbon Brush Wear, by Robert H. Savage. Chapter 7. The Wear and Damage of Metal Surfaces With Fluid Lubrication, No Lubrication and Boundary Lubrication, by F. P. Bowden and D. Tabor. Chapter 8. Wear in Steam Turbines, by Norman L. Mochel. Chapter 9. The Need for Studies of "Real" Hydrodynamic Lubrication, by R. W. Dayton. Chapter 10. The Dielectric Strength of Oil Film in Plain Bearings, by C. M. Allen. Chapter 11. Gear Wear as Related to the Viscosity of the Gear Oil, by H. Blok. Chapter 12. Surface Deterioration of Gear Teeth, by J. O. Almen. Chapter 13. Recent Roll Tests on Endurance Limits of Materials, by E. Buckingham and G. J. Talbourdet. Chapter 14. Hardness and Its Influence on Wear, by Ragnar Holm. Chapter 15. Wear of Metals Against Smooth Refractory Materials, by Lowell H. Milligan. Chapter 16. Friction and Wear of Some Powder Metallurgy Bronzes, by John Dedrick and John Wulff. Chapter 17. Summary of Factors in the Wear Process, by John T. Burwell, Jr.

375 page . . . 6 x 9 . . . 182 illus. . . . red cloth . . . $6.50

Machining—Theory and Practice

TABLE OF CONTENTS

Metal Cutting: Art to Science, by Hans Ernst, Research Director, Cincinnati Milling Machine Co.; Metal Cutting Research—Theory and Application, by M. E. Merchant, Senior Research Physicist, Cincinnati Milling Machine Co.; Cutting Fluid Theory, by M. C. Shaw, Associate Professor of Mechanical Engineering, Massachusetts Institute of Technology; Development of the Macrostructure of Metals by Machining, by L. M. Clarebrough and G. J. Ogilvie, University of Melbourne; Materials and Machinability, by F. W. Boulger, Supervising Metallurgist, Battelle Memorial Institute; Metallurgy and Machinability of Steels, by J. D. Armour, Chief Metallurgist, Union Drawn Steel Div., Republic Steel Corp.; Tool Steels, by G. A. Roberts, Chief Metallurgist, Vanadium-Alloys Steel Co.; Cemented Carbide Tool Materials, by J. C. Redmond, Research Engineer and Chief Chemist, Kennametal, Inc.; Heat in Metal Cutting, by A. O. Schmidt, Research Engineer, Kearney & Trecker Corp.; Evaluation of Machinability of Rolled Steels, Forgings and Cast Irons, by Michael Field and N. Zlatin, Partners, Metcut Research Associates; Tool Life Testing, by O. W. Boston, Professor of Metal Processing and Chairman of Department of Metal Processing, University of Michigan; Some Metallurgical Aspects of Grinding, by L. P. Tarasov, Research Metallurgist, Norton Co.; Economics of Machining, by W. W. Gilbert, Associate Professor, University of Michigan.

600 pages . . . 6 x 9 . . . 200 illus. . . . red cloth . . . $6.50

Thermodynamics in Physical Metallurgy

TABLE OF CONTENTS

The Principles of Thermodynamics, by P. W. Bridgman, Harvard University; Contributions of Statistical Mechanics, by C. Zener, Institute for the Study of Metals, University of Chicago; Application of Thermodynamics to Heterogeneous Equilibria, by L. S. Darken, U. S. Steel Corp.; Application of Electromotive Force Measurements to Phase Equilibria, by F. J. Dunkerley, University of Pennsylvania; Some Physical Interpretations of Constitution Diagrams, by A. W. Lawson, Institute for the Study of Metals, University of Chicago; Thermodynamics of Liquids, by John Chipman, Massachusetts Institute of Technology, and John F. Elliott, U.S. Steel Corp.; Physical Factors Affecting Order, by C. E. Birchenall, Carnegie Institute of Technology; Nucleation, by J. H. Hollomon, General Electric Co.; Precipitation, by Charles Wert, Institute for the Study of Metals, University of Chicago; Eutectoid Decompositions, by John Fisher, General Electric Co.; Martensite Transformations, by Morris Cohen, Massachusetts Institute of Technology; Magnetic Domains, by Lieuwe Dijkstra, Institute for the Study of Metals, University of Chicago; Principles Governing Solidification, by D. Turnbull, General Electric Co.; Role of Thermodynamics in Metallurgy Research, by J. B. Austin, U. S. Steel Corp.

319 pages . . . . . 6 x 9 . . . . . red cloth $5.00

The American Society for Metals

7301 Euclid Ave., Cleveland 3, Ohio

Please send me:

- ☐ Thermodynamics in Physical Metallurgy $5.00
- ☐ Mechanical Wear 6.50
- ☐ Casting of Brass and Bronze 3.50
- ☐ Machining—Theory and Practice 6.50

Name . . . . . Title . . . . .

Firm . . . . . Street . . . . .

City . . . . . Zone . . . . State . . . . .

Check enclosed ☐ Bill me ☐ Bill my company ☐

EMPLOYMENT SERVICE BUREAU

The Employment Service Bureau is operated as a service to members of the American Society for Metals and no charge is made for advertising insertions. The "Positions Wanted" column, however, is restricted to members in good standing of the A.S.M. Ads are limited to 50 words and only one insertion of any one ad. Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, O., unless otherwise stated.

POSITIONS OPEN

East

SALES ENGINEER: Leading ferrous metal powder producer requires qualified sales engineer fully familiar with metal fabrication and tools. Headquarters in East. Position requires frequent traveling. Reply in absolute confidence with complete resume of experience, education, etc. Box 8-5.

METALLURGIST: Graduate, for foundry production and development work in growing New Hampshire investment casting company. Job includes work in all phases of production and research in investment casting, providing sufficient responsibility for proving ability. Previous foundry experience desirable but not required. Adequate housing available, city or country. Box 8-10.

METALLURGISTS (2): Naval Air Material Center. Salary $5940 per year. Duties in general are: One metallurgist as senior project engineer of small group engaged in development of oxidation-resistant metallic coatings and evaluation of heat resisting alloys in creep and stress rupture for jet engine use. One metallurgist to plan installation of precision casting laboratory, conduct investigations on precision casting processes and techniques leading to their application for production of heat resistant alloy parts, and to develop and assist in evaluating improved heat resisting alloys. Write to: Industrial Relations Dept., Naval Air Material Center, Naval Base, Philadelphia 12, Pa., and request an application for employment.

Midwest

RESEARCH METALLURGISTS: Young graduates, preferably with M.S. degrees, to conduct research projects in physical metallurgy, both ferrous and nonferrous. Attractive permanent opportunities in large Detroit automotive firm. Box 8-15.

METALS JOINING ENGINEER: Large independent research organization has opening for metallurgical engineer with interest in and knowledge of research methods in brazing, soldering, and welding. Excellent opportunity to advance with a growing organization. Write: Metals Dept., Armour Research Foundation of the Illinois Institute of Technology, Chicago 16, Ill.

METALLURGICAL ENGINEER: For titanium research programs. Excellent opening in well-known research organization for metallurgical engineer interested in the physical metallurgy of titanium. Advanced college training and some experience in metallurgical research desirable. Outstanding opportunity for personal and professional growth in an expanding organization. Write: Metals Dept., Armour Research Foundation of the Illinois Institute of Technology, Chicago 16, Ill.

Southwest

METALLURGICAL ENGINEER (2): Experienced in ferrous and nonferrous metallography, ferrous and nonferrous heat treatment and welding, specifications, and service failure investigation. Box 8-20.

X-RAY ENGINEER: Experienced in ferrous and nonferrous metals, extensive background in soft alloys, capable of setting up standards and making interpretations. Box 8-25.

FOUNDRY METALLURGIST: To assist in supervision of small nonferrous foundry. Work primarily developmental with some routine production. Vacuum melting experience desirable but not essential. Excellent working conditions. Write: Personnel Dept., University of California, Los Alamos Scientific Laboratory, P. O. Box 1663, Los Alamos, N. M.

POSITIONS WANTED

METALLURGIST or MATERIALS ENGINEER: Ten years in large metal fabricating plant manufacturing instruments. Wide knowledge metallic materials. Experience includes supervision of several metallurgists engaged in consulting on manufacturing and engineering problems, testing, and setting up research program. B.S. in metallurgy, graduate fellowship. Age 35. Present salary $7200. Box 8-30.

METALLURGICAL ENGINEER: Married, age 29, B.S. degree. One and one-half years experience in ferrous metallurgy in research, product development and service failure investigations of railroad springs and forgings. Prefer midwest or west, but will consider other locations. Box 8-35.

DEVELOPMENT ENGINEER: Three years industrial and 1½ years combustion experience. Metallurgical graduate. Age 26, draft exempt. Experienced in metallurgical testing, report writing, industrial dust research, development

Engineering Laboratory Welding Engineer

Graduate engineer with two to four years' experience in resistance and fusion welding to assist in aircraft design applications, processing problems, and development work. Should be acquainted with types of welding equipment used on ferrous and nonferrous metals, and able to correlate design and metallurgical requirements with processing methods.

NORTH AMERICAN EXTRAS—Salaries commensurate with ability and experience • Paid vacations • A growing organization • Complete employee service program • Cost of living bonuses • Six paid holidays a year • Finest facilities and equipment • Excellent opportunities for advancement • Group insurance, including family plan • Paid sick leave • Transportation and moving allowances • Educational refund program • Low-cost group health (including family), and accident, and life insurance • A company 24 years young.

WRITE TODAY—Please write us for complete information on career opportunities at North American. Include a summary of your education, background, and experience.

NORTH AMERICAN AVIATION, INC.
Engineering Lab Personnel, Dept. C-8
4300 E. Fifth Ave., Columbus, Ohio
North American Has Built More Airplanes Than Any Other Company in the World

HERE'S HOW . . .

To get copies of articles annotated in the A.S.M. Review of Current Metal Literature

Two alternative methods are:

1. Write to the original source of the article asking for tear sheets, a reprint or a copy of the issue in which it appeared. A list of addresses of the periodicals annotated is available on request.

2. Order photostatic copies from the New York Public Library, New York City, from the Carnegie Library of Pittsburgh, 4400 Forbes St., Pittsburgh 13, Pa., or from the Engineering Societies Library, 29 West 39th St., New York 18, N. Y. A nominal charge is made, varying with the length of the article and page size of the periodical.

Write to Metals Review for free copy of the address list

METALS REVIEW

7301 Euclid Avenue **Cleveland 3, Ohio**

and quality control in openhearth, forging and rolling mills, and fuel combustion problems. No location preference. Good references. Box 8-40.

METALLURGICAL ENGINEER: B.Met.E. degree, age 23, married. Presently in service, to be discharged January 1953. One year in titanium casting research and development. Desires position with reliable company. Prefer west but will go anywhere. Box 8-45.

MECHANICAL ENGINEER: Fluent English, Spanish, German, Italian. Twenty years experience in machine shops, foundries, mills. Presently manager sales and technical service, steel and metallurgical departments, large importers. Desires managerial position, preferably export-import work, steel or metallurgical products. Will locate in South America or United States. Box 8-50.

METALLURGIST: B.S. degree. Approximately 17 years diversified supervisory experience in ferrous and nonferrous metallurgy in heat treating, laboratory control, development work, metallography, trouble shooting, and technical sales and customer contact as sales metallurgist. Presently employed as metallurgist. Desires employment as heat treat superintendent, metallurgist or sales metallurgist. Prefer eastern location. Box 8-55.

METALLURGICAL ENGINEER: One year graduate study. Age 28. Two years experience in ferrous and nonferrous production metallurgy, heat treatment, metallography, problem investigations, physical testing. Familiar with metallurgical control procedures and material acceptance. Desires responsible position in production control, development, or materials engineering. Box 8-60.

METALLURGIST: M.S. degree. Age 30. Veteran. Married, one child. One year experience as assistant metallurgist, heat treating company. Three years as laboratory instructor, metallography. One year as research assistant. Currently employed but desires change for purposes of technical and financial advancement. Philadelphia area only. Resume on request. Box 8-65.

METALLURGICAL ENGINEER: M.S. degree. Married, age 36. Wide experience in ferrous and nonferrous physical metallurgy. Four years mill control and laboratory work, four years direct supervision shop operations, four years managerial staff position. Desires executive position in technological work with wider range of problems and direct line responsibilities. Box 8-70.

METALLURGICAL ENGINEER: Registered professional graduate with 7½ years experience in physical ferrous metallurgy. Desires position with fabricator or manufacturer. Thoroughly familiar with application and processing of carbon and alloy steel, investigation of service failures, trouble shooting on plant problems, and report writing. Box 8-75.

METALLURGIST: Advanced degrees from well-known universities. Several years of industrial experience, teaching, fundamental research, and applied research. Broad knowledge of extractive and adaptive metallurgy and allied fields. Desires academic position with reasonable rank and salary, west or midwest, with progressive college or university. Box 8-80.

INDUSTRIAL ARTS GRADUATE: B.S. degree, married, two children. Age 36. Ten years machine shop experience, including some tool and die work. College courses included 12 hrs. metallurgical studies. Desires opportunity to apply knowledge of metallurgy and machine shop experience in production problems. Midwestern location preferred. Box 8-85.

METALLOGRAPHER

SYLVANIA'S metallurgy laboratories located at Sylvania Center, Bayside, Long Island, needs a metallographer technician. Two years technical college highly desirable or sufficiently great experience in the field. Must have five years experience in industrial or academic metallography laboratory. Experience should be in more than one metal. Some supervisory experience desirab'e. Must be capable of investigating new techniques and putting them into operation. Please send complete resume to:

MANAGER OF PERSONNEL

SYLVANIA
Electric Products, Inc.
40-22 Lawrence St., Flushing, L. I.

RESIDUAL STRESS MEASUREMENTS

This volume, written by four outstanding authorities, devotes 204 pages to the important problem of the nature and extent of residual or "internal" stresses in metals and metal parts prior to actual structural or operating use.

How to measure residual stresses . . .The state of stresses produced in metals by various processes . . . Relief and redistribution of residual stresses in metals . . . How residual stresses originate, their nature and their effect on metals.

204 pages, $4.50

PUBLISHED APRIL 1952

AMERICAN SOCIETY for METALS
7301 Euclid Ave. Cleveland 3

A COMPREHENSIVE METALLURGICAL INDEX

WHAT IT IS:

The ASM-SLA Metallurgical Literature Classification is a subdivided outline of the entire science of metallurgy that provides a guide to the filing and indexing of metallurgical literature and data collections. It can be used with standard card indexing and literature filing systems or with a specially designed punched-card system. The complete classification outline and instructions for its use are contained in a handy 8½ x 11 paper-bound booklet, selling for a dollar.

WHO MADE IT:

The classification was prepared by a joint committee of the American Society for Metals and the Special Libraries Association. Its authority, accuracy and completeness have been checked by experts in all branches of metallurgy.

WHAT DO I NEED?

First, the booklet containing the classification proper—essential for all purposes . . . *Second,* a set of looseleaf worksheets which provide capacity for the individual user to expand minor fields, to add new subjects, and to develop desired sidelines—essential only for the user who wishes more detail than provided in the existing outline . . . *Third,* Punched cards and punched-card equipment—a new and efficient bibliography filing method.

WHERE DO I GET IT?

The classification book and the Worksheets are available from the American Society for Metals, 7301 Euclid Ave., Cleveland, Ohio. The punched cards and punched-card equipment may be purchased from Lee F. Kollie, Inc., 35 East Wacker Dr., Chicago 1, Ill.

For further details, write:

AMERICAN SOCIETY FOR METALS
7301 Euclid Avenue Cleveland 3, Ohio

Engineering Laboratory Metallurgist

Graduate engineer with two to four years' experience in one or more of the following fields: High-temperature alloys, aluminum alloys, or bearing materials, and metal lubricants. To assist in aircraft design applications, processing problems and development work.

NORTH AMERICAN EXTRAS—Salaries commensurate with ability and experience • Paid vacations • A growing organization • Complete employee service program • Cost of living bonuses • Six paid holidays a year • Finest facilities and equipment • Excellent opportunities for advancement • Group insurance, including family plan • Paid sick leave • Transportation and moving allowances • Educational refund program • Low-cost group health (including family), and accident, and life insurance • A company 24 years young.

WRITE TODAY—Please write us for complete information on career opportunities at North American. Include a summary of your education, background, and experience.

NORTH AMERICAN AVIATION, INC.
Engineering Lab Personnel, Dept. C-8
4300 E. Fifth Ave., Columbus, Ohio

North American Has Built More Airplanes Than Any Other Company in the World

A.S.M. Review of Metal Literature

(*Continued from page* 58)

sion resistance, applications, etc. Ore reduction of Ti from rutile, and production and fabrication of the metal. (Ti)

130-V. Boron Steels Studied. *Steel,* v. 130, June 30, 1952, p. 93, 96.

Research is shifting from the study of mechanical properties to study of specific properties and applications. These include fundamental research. A list of projects recommended for future investigation. (AY)

131-V. The Rise of Titanium. *Westinghouse Engineer,* v. 12, July 1952, p. 114-117.

A survey covering various properties, processes, and applications. (Ti)

132-V. Titanium at Work in Jet Engines. P. G. DeHuff and W. S. Hazelton. *Westinghouse Engineer,* v. 12, July 1952, p. 118-120.

See abstract of "What We Know About Titanium", *Aviation Week;* item 114-V, 1952.

(T24, Q general, F22, G17, K general, Ti)

133-V. (French.) Utilization of Tungsten. Ch. More. *Métallurgie et la Construction mécanique,* v. 84, May 1952, p. 315, 317-318.

A review on the basis of the literature, particularly the manufacture and use of tungsten carbides, and other possibilities of utilization. 28 ref. (W, C-n)

134-V. (German.) New Results of Research on High-Melting Metallic Hard Metals. (Continued.) R. Kieffer and F. Benesovsky. *Metall,* v. 6, May 1952, p. 243-250

Reviews literature data on borides and silicides. Their production, phase relationships, and technical applications. Tables, charts, and micrographs. 57 ref. (B, Si, SG-j)

135-V. Choosing Alternate Steels. H. B. Knowlton. *Machine Design,* v. 24, July 1952, p. 217-218, 220, 222, 224.

See abstract of "An Investigation of Boron and Other Low-Alloy Steels." *Steel Processing;* items 59-V and 104-V, 1952. (AY)

136-V. (Book). Titanium Metal and Its Future. 103 pages. 1952. Harvard Business School, Cambridge, Mass.

A group project by nine 2nd-year students at the Harvard Graduate School of Business Administration. The information was obtained from three major sources: published material appearing in company and government literature, statistical reports, and magazine articles; personal discussion with some of the Ti producers and research organizations; correspondence with other Ti producers and potential consumers of Ti. Covers history, properties, alloys, ores, processing, melting, forming, fabricating, and the industry today and in the future. Includes short selected bibliography. (Ti)

137-V. (Book). Tungsten: A Treatise on Its Metallurgy, Properties and Applications. Ed. 3. C. J. Smithells, editor. 320 pages. Chapman and Hall, Ltd., 37 Essex St., London W.C. 2, England. 75s. net.

Second edition was published 15 years ago. Most of the chapters have been rewritten by experts in various aspects of the subject. (W)

HOW TO:

Be An Active Member*

Ten Ways to Kill an Association

1. Don't come to the meetings.
2. If you do come, come late.
3. If the weather doesn't suit you, don't think of coming.
4. If you don't attend, find fault with the work of the officers and other members.
5. Never accept an office, as it is easier to criticize than to do things.
6. Nevertheless, get sore if you are not appointed on a committee, but, if you are, don't attend the committee meetings.
7. If asked by the chairman to give your opinion regarding some important matter, tell him you have nothing to say. After the meeting tell everyone how things ought to be done.
8. Do nothing more than is absolutely necessary, but when other members roll up their sleeves, and willingly, and unselfishly use their ability to help matters along, howl that the association is run by a clique.
9. Hold back your dues as long as possible, or don't pay at all.
10. Don't bother about getting new members, let the other fellow do it.

*From *Power,* August 1950

Be Fully Informed about

TOOL STEELS

Own your own copy of the book

"TOOL STEELS"

by

J. P. Gill
R. B. George
G. A. Roberts
H. G. Johnstin

Chapters on Manufacture, Classification, Testing, Selection, Heat Treatment, and on each principal type of tool steel.

578 pages
277 illustrations
564 references in bibliography
$7.50

AMERICAN SOCIETY FOR METALS
7301 Euclid Ave., Cleveland 3, Ohio

A.S.M. Becomes Affiliate of A.I.P.

The American Institute of Physics has invited the American Society for Metals to become affiliated with their Society. Acceptance of this invitation now allows A.S.M. members to subscribe to the journals of the A.I.P., the *Review of Scientific Instruments, Journal of Applied Physics,* and *Journal of Chemical Physics,* at $1 lower than the regular rate.

Kaiser Aluminum Expands Sales Outlets

Expansion of service to aluminum fabricators through the establishment of nine new sales offices and five newly appointed distributors has been announced recently by Kaiser Aluminum & Chemical Sales, Inc. Oakland, Calif. Combined operation of these 14 sales outlets will cover fabricators in over 11 states.

Sales offices were opened in Birmingham, Ala., New Orleans, La., Grand Rapids, Mich., Tulsa, Okla., Pittsburgh, Pa., Miami, Fla., Baltimore, Md., Evansville, Ind., and Columbus, Ohio.

TO EVERY MAN

. . . invited to attend the greatest metal show in history!

THIS is important to you! So many exhibitors have planned the introduction of entirely new and improved products and processes at the Big Metal Show in Philadelphia that every man interested in the future of the metals industries ought to be there . . . just to keep abreast of what's going on!

PHILADELPHIA • OCTOBER 18-24 • 1952

FIVE MINUTES NOW CAN SAVE YOU

FILL OUT THE ATTACHED REGISTRATION CARD. *PRINT* THE INFORMATION — OR HAVE SOMEBODY TYPE IT. PUT IT IN THE MAIL TODAY! IT'LL TAKE A FEW MINUTES . . . AND YOU'LL BE ABLE TO WALK RIGHT ON INTO THE BIG METAL SHOW WITHOUT WAITING IN LINE . . . WITHOUT DELAY!

30 MINUTES LATER ON . . .

MAIL COUPON TO:

REGISTRATION COMMITTEE
NATIONAL METAL EXPOSITION
PHILADELPHIA CONVENTION HALLS
PHILADELPHIA 3, PA.

This advance registration card should reach the committee by October 10, 1952, for its processing and the return to you before the opening of the show

REGISTRATION CARD ★ NATIONAL METAL EXPOSITION

YOUR NAME _____

TITLE OR POSITION _____

COMPANY _____

STREET _____

CITY AND STATE _____

MAJOR PRODUCT OR SERVICES OF YOUR PLANT _____

_____

MEMBER OF: ASM ☐ AWS ☐ AIME ☐ SNDT ☐

PLEASE CHECK DEPARTMENT IN WHICH YOU ARE EMPLOYED:

1) MANAGEMENT ☐ 3) ENGINEERING ☐ 5) PURCHASING ☐ 7) EDUCATION ☐
2) PRODUCTION ☐ 4) METALLURGY ☐ 6) SALES & ADV. ☐ 8) GOVERNMENT ☐

● ***Mail Prior to October 10 or Present at Registration Desk for Badge*** ●

FILL IN THIS COUPON AND MAIL TODAY

★

YOUR BADGE WILL BE MAILED TO YOU BY OCTOBER 10th

★

1. Proved in industrial use

The widespread adoption of Holden Carburizing Baths by the metalworking industry proves it is not only possible but also *practical* to compound baths that are completely water-soluble, containing no barium or calcium salts that can change to insoluble carbonates.

2. Faster cleaning

After quenching in water or oil, parts carburized in a modern Holden Bath wash readily in plain hot water or in an alkaline cleaner. Contrast this speedy cleaning process with the time-consuming spray washing or acid pickling required to remove the insoluble residue left on parts by oil quenching after the older type of bath.

3. No waste

There are seven distinct Holden Liquid Carburizing Baths, developed to meet your needs efficiently and economically.

4. Clean silver finish

Use Holden Clear Quench Oil for a clean silver finish after carburizing.

5. Uniform penetration

The modern Holden Bath assures you a controlled rate of carburizing that gives uniform penetration.

6. Distortion controlled from .001" to .002"

(1) Preheat 1350° F.
(2) Carburize 1500-1700° F.
(3) Stabilize quench 1400 to 1475° F.
(4) Oil quench 110 to 120° F.
(5) Temper to desired hardness.

1. Holden Salt Baths can be used in any type of salt bath furnace with — steel — alloy —or ceramic pots.

2. *Guarantee:*

Holden Salt Baths can be used in any type of competitive furnace. We will assume manufacturer's guarantee with any proven design.

THE A. F. HOLDEN COMPANY

P. O. Box 1898
New Haven 8, Conn.

11300 Schaefer Highway
Detroit 27, Michigan